MOTOR AGE

Vol. XXXI
No. 15

CHICAGO, APRIL 12, 1917

Ten cents a copy
Three dollars a year

Can You Look Ahead

to a certain future — to greater profits like Hudson Dealers can?

Does the car you sell offer you the right kind of a future? The opportunity to grow, to make money this year and the next? Can you, like Hudson dealers, see years of profits ahead?

In the early days of the automobile business many cars were started with a blue-print, a printed sales and advertising plan. Broad promises were made to secure dealers. Sometimes the cars were never built. It was necessary in those days for dealers to shift from car to car. What profits they did make in one season were generally used up in the next.

But mark the history of Hudson dealers. How few the changes. How permanent their business. All of these years have been money making years for Hudson dealers.

If you will look about, you will generally find that the leading automobile merchant in your community sells Hudsons. He shares the reputation for stability that Hudson enjoys. He knows that every contract he makes with Hudson is another step toward a greater future.

Once in a while circumstances compel us to make a change in our representation, or territory is divided and new dealers are added. Those dealers who would some day like to be a part of the Hudson organization are requested to send us their names. We want to know every real automobile merchant.

HUDSON SUPER SIX

HUDSON MOTOR CAR COMPANY
DETROIT, MICHIGAN

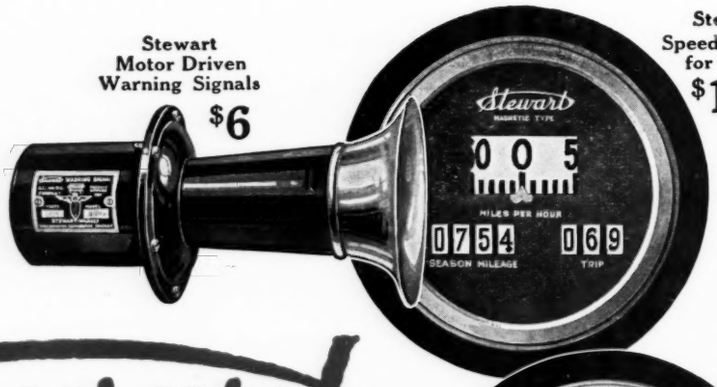
Hudson Super-Six the largest selling fine car in the world

Editorial Contents—Page 3

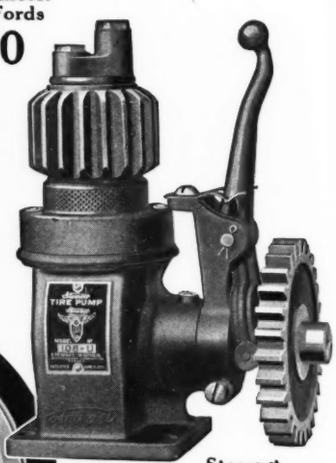
Advertisers' Index—Next to Last Page

In This Issue—Making American Aviators in France

Stewart
Motor Driven
Warning Signals
$6



Stewart
Speedometer
for Fords
$10



Stewart
Tire Pump
$12

Stewart Products

Stewart
Speedometer
$25

Eliminate Sales Resistance

How much resistance do you have to overcome in selling an accessory?

How much doubt exists in the mind of the customer when you offer him an unknown, unadvertised device? How much time is required to make the sale?

It is easy to cut down the time required to make a sale so that one salesman may serve more customers, make sales faster—and earn more money for you. Take a tire pump for instance: There are all kinds of pumps. But, offer a customer a Stewart Tire Pump and undoubtedly you will find that he is already half sold on it; he probably knew all about the Stewart Tire Pump before he entered your store. Offer a customer a Stewart Product, FIRST—in nearly every case you will make the sale.

This is but another example of the advantage of selling advertised goods. There is scarcely a motor car owner who does not read Stewart Products advertising in the national publications.

Are you capitalizing this?

Are you taking advantage of the prospects that are being prepared for you?

Are you backing our advertising by carrying a complete stock of Stewart Products? Your business sense tells you it pays to sell Stewart Products.

Let us tell you more about them.

Stewart
Vacuum System
$10

Stewart
PRODUCTS
PRESTIGE
QUALITY
SERVICE
SATISFACTION
MADE IN
USA

Stewart
Hand Operated
Warning Signal
$3.50

Warner
Auto-Meter
$50

Stewart
Spark Plug
$1

The Stewart-Warner Speedometer Corporation
Chicago, Illinois, U.S.A.

MOTOR AGE

Published Every Thursday by the
CLASS JOURNAL COMPANY
Mallers Building
CHICAGO ILLINOIS

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, Under Act of March 3, 1879—Member of the Audit Bureau of Circulations—Copyright, 1916, by the Class Journal Co.

United States, Mexico and U. S. Possessions. One Year $3.00
Canada .....One Year $5.00
All Other Countries in Postal Union.....One Year $6.00

BEWARE OF SUBSCRIPTION SOLICITORS OFFERING PREMIUMS OR CUT RATES—ALL CURRENCY SHOULD BE SENT BY REGISTERED MAIL.

RENEWALS or CHANGES OF ADDRESS should be sent two weeks in advance of date they are to go into effect. Be sure to send old as well as new address to avoid unnecessary delay. RECEIPT of first copy is acknowledgment of subscription.

Vol. XXXI April 12, 1917 No. 15

Contents

MAKING AMERICAN AVIATORS IN FRANCE... 5
EDITORIAL—UNCLE SAM, CAN'T YOU USE US? —MOTOR RESERVE CORPS..... 14
HOW CAN THE MOTORISTS HELP IN THEIR COUNTRY'S DEFENSE?..... 15
AIRPLANE ENGINES FOR U. S..... 16
WAR CENSUS OF TRUCKS..... 17
BUILDING ROADS TO BATTLEFIELDS..... 18
WILL MOBILIZE MOTORS..... 22
A SCHOOL THAT USES MOTORS AS TEXT-BOOKS 28
ELECTRICAL EQUIPMENT OF THE MOTOR CAR.32
MOTOR CAR DEVELOPMENT..... 38
The Yale eight chassis bodies, Scott three-wheeler, Jackson and Liberty Springfield types and the Selden and Koehler light trucks described and illustrated.

DEPARTMENTS

MOTOR CAR REPAIR SHOP..... 35
FROM THE WOMAN'S VIEWPOINT..... 36
READERS' CLEARING HOUSE..... 42
ACCESSORY CORNER..... 48
FROM THE FOUR WINDS..... 50
AMONG THE MAKERS AND DEALERS..... 51

ANNOUNCEMENT

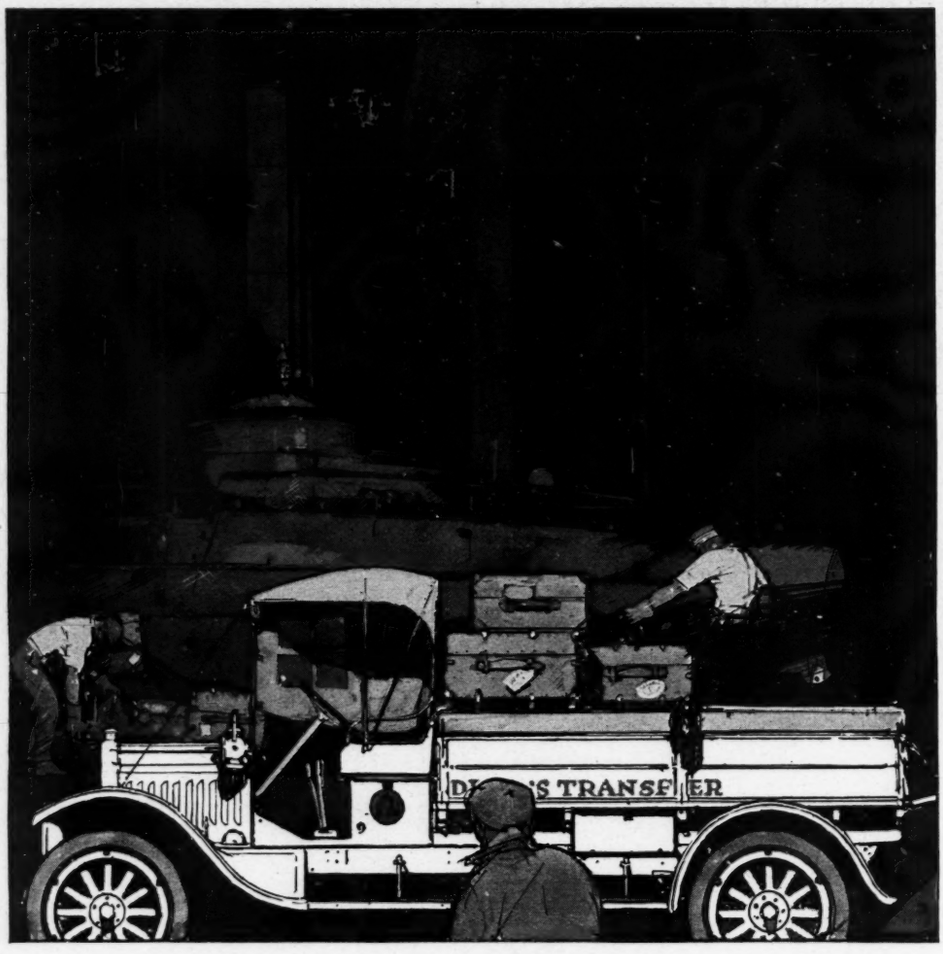
Next week Motor Age will publish a story as opportune as that of the American aviators this week. Read it and learn how motors serve an army. It is by W. F. Bradley, Motor Age's European correspondent.

Kelly-Springfield Tires made their reputation on the big, powerful cars that tour the highways and by-ways of this broad land from ocean to ocean. The owners of these cars know that

Kelly-Springfield Tires

deliver their mileage on the road—where they want it—not over the counter in contentious adjustments.

Kelly-Springfield Tire Co.
Executive Offices
Broadway at 57th Street
New York
General Sales Department
1900 Euclid Avenue
Cleveland, O.



WHITE TRUCKS

WHAT a truck actually costs is not known until you have operated it for some time. The purchase price is often insignificant when compared with the maintenance and operating bills. The largest users of trucks consider it far cheaper to invest more money in White Trucks and enjoy unfailing service and low expenses over a long period of years—than to buy medium-grade trucks, pay higher bills for less dependable service and stand more rapid depreciation on the investment.

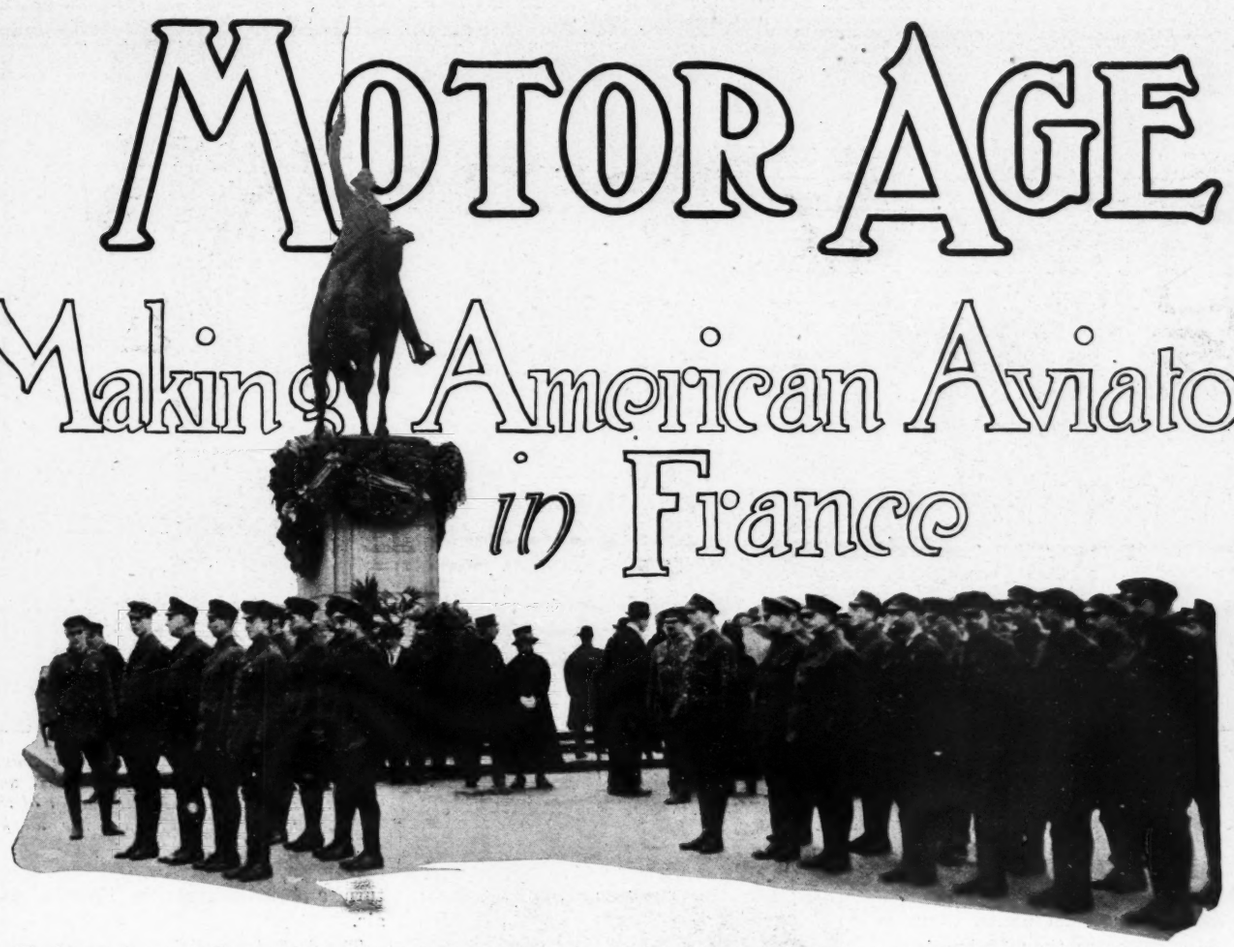
THE WHITE COMPANY

CLEVELAND

Vol. XXXI, No. 15 Chicago, April 12, 1917 $3.00 per Year

MOTOR AGE

Making American Aviators in France



Washington's statue, Paris and American aviators! The scene has even more significance now than it did on Washington's birthday, when the aviation corps serving with France celebrated

EDITOR'S NOTE—The United States needs aviators. Every effort is is to be made to train them. In view of this need and the conditions out of which it arises, war and war's demands, no story can be more opportune than that of how American aviators have been made in France during those months of American peace and war aloofness

SOMEWHERE in France, March—Much interest has been aroused throughout the United States by the enlistment of Americans in the French air service, and publicity has been given to the good work they have accomplished at the front; yet, few persons have any conception of the training these men have to undergo before they are ready and in a condition to meet the requirements of active service.

It should be understood that all Americans are trained for the best positions in the avitation service—for the post of pilot of an *avion de chasse,* as the fast single-seater scout machines are termed officially. In this work individual ability has its greatest opportunity, and though the risk is great, the possibilities of advancement are high.

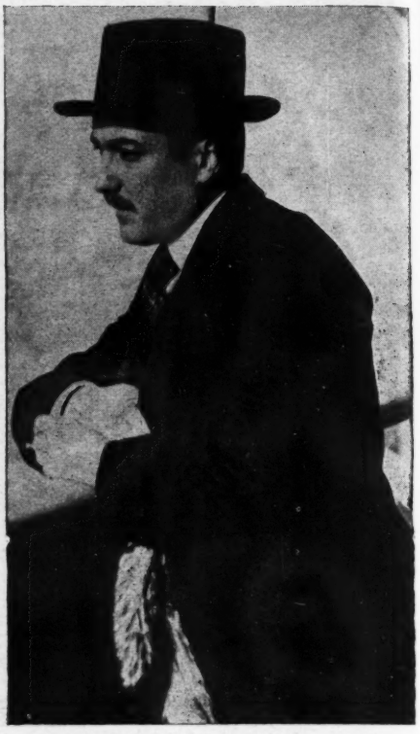
On arrival in Paris the candidate for admission into the Franco-American flying corps makes a formal application to the ministry of war and after passing a physical examination at the recruiting office is accepted formally at the Invalides as a second class soldier of the Foreign Legion, and is attached to the first aviation group, with headquarters at Dijon. He does not go to Dijon, however, but is sent to the training school at Buc, a few miles west of Paris, where the Blériot factory and school is located. Here he is entered on the rolls as a pilot pupil. At the *bureau de detachment* the pupil's name is entered on the lists, together with his past military service, if any, his next of kin, and the person to notify in case of accident.

From this office he proceeds to the Pilotage, which is the office of the chief pilot responsible for all school work. Here the pupil is allotted to a class and told to which instructor he must report.

Before taking up actual work the pupil receives from the local quartermaster the necessary articles of army equipment, as well as additional clothing alloted to all aviator pupils. This comprises a leather flying suit, helmet, knitted hood, fur gloves, glasses and a pair of fur-lined arctic boots. Each man receives an official badge, which must be worn always. It represents a single wing attached to a star. Later, on obtaining his pilot's certificate, the badge is changed for one with two wings.

The pupil is now ready for work and reports with his class at 7:30 in winter, earlier in summer, and works until 10:30, when a stop is made for breakfast at 11. This is a hearty meal of soup, meat and vegetables. Assembly is at 1 p. m., and training is carried on until 5 o'clock, when all duties are over for the day, the evening meal coming at 6:15. From 5 until 9 the pupils are at liberty to visit the villages in the neighborhood. Lights are extinguished at 9:30 promptly. All work naturally is dependent on weather conditions, and when these are adverse, the school is dismissed usually for the time being. Leave of absence is given every two weeks for a period of 24 hours, but this can be suppressed for bad work or bad conduct on the part of a student. Under this time table the pupil has little opportunity to get away from the school, for when he is not in actual training there are many little incidents in camp life which tend to fill up his spare moments.

Two American aviators with France, Elliott Cowdin, who has been decorated by the French government, extreme left, and William Thaw, Pittsburgh, extreme right



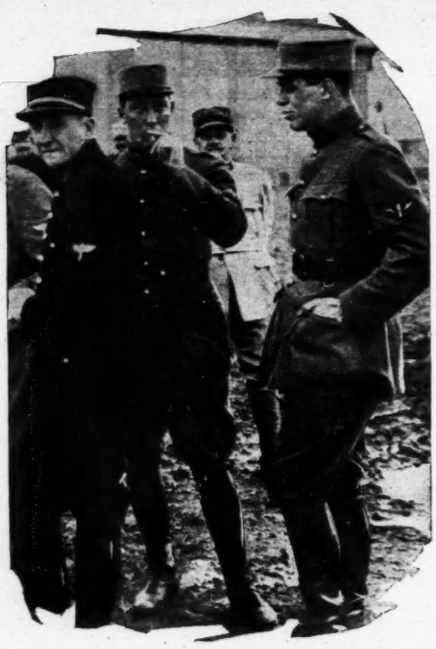
Sometimes they come back on leave. This picture of C. C. Johnson was taken as he arrived in the harbor of the Goddess of Liberty on three weeks' leave

The school course is arranged to form pilots within a maximum period of three months, with not more than 30 hr. actual flying. In this time it is possible to form pilots full of enterprise, capable of flying under all weather conditions, of landing on any kind of ground, of guiding their machines perfectly in the air and of repairing the minor breakdowns of an engine.

Bleriot Is Used

All training is given on Bleroit monoplanes, which is rather surprising, considering the general opinion held of ths type of machine just before the war. The choice, however, is justified by the high percentage of pilots successfully passed for work on fast scout machines. The number of rejections at the Nieuport finishing schools is very much less than for men trained in any other way or on any other make of airplane.

The student gets first a machine known as a penguin, on which he learns to make a straight run on the ground, to maintain his line of flight and to use his engine controls. He is taught to use his rudder by reflex movements, and should master all these elementary matters in about twenty trips. Having passed the first stage, he is advanced to a larger machine of about the same power and speed that can actually fly. He is forbidden, however, to get into the air at this stage, but must drive his airplane over the ground at full speed, keeping the tail at the correct position, thus learning to judge the speed of his machine and the force of the wind.



An American aviator who was killed in action, Sergeant J. P. McConnell, the man smoking

With this machine from three to six trips are generally sufficient. At the end of this time the pilot should be able to guide a machine along the ground by the rudder. During the two first stages the engine used is a three-cylinder air-cooled Anzani of about 30 hp.

A Second Machine

The next machine is a higher-powered airplane, usually fitted with a six-cylinder 45-hp. Anzani air-cooled engine. In this class the pupil learns to have his machine thoroughly in hand, to run at top speed along the ground, to get off the ground and keep a horizontal line of flight, to land, to turn and to change his direction in the air.

The first stage with his machine is called straight-lines, and consists of flying 60 in. from the ground. A landing is made by combining the weight of the machine with its acquired speed, landing by switching the ignition off and on. During the short period when the ignition is cut, the weight of the machine causes it to drop to the ground, but this does not prevent it keeping its line of flight.

Learning to Land

During the second stage the pilot flies at a height of not less than 5 ft., and not more than 50 ft. from the ground. The machine is then too high to land by cutting out the ignition, and too low to land by tipping forward. It is, therefore, necessary to lose height without cutting out the ignition, coming down very gradually and then, when 5 ft. from the ground, regaining the normal line of flight, maintaining it for a few seconds, and finally landing as learned in the first stage.

In the third stage the pupil has to make a landing from a height of more than 50 ft. He does this by causing the machine to dive, switching off the ignition immediately, bringing the machine to its normal position very gradually, so that the movement is imperceptible to the eye of a spectator, and at 5 ft. becomes parallel with the ground. Then as the speed gathered in the descent is acting against gravity the machine lands in its line of flight, tail up, which brings the pupil back to the landing in the first stage, but in this case

French warplane with new revolving gun ready for action. This is the fastest type of airplane in the French service. The opening in the bottom is for dropping shells released by the aviator's foot

As deadly as it looks! A French reconnoitering machine with two machine guns. These guns are for defense and not attack. The French use a Farman biplane usually for reconnoitering work

it is done without using the switch. This method of landing is known as an airdrome landing.

The fourth stage is known as a field landing, the object being to come down as slowly as possible and, consequently, to roll as short a distance as possible on the ground. This system is intended for use on rough ground or very small fields, where a long roll might cause a capsize. To get this result, the nose of the machine is turned down and the ignition cut at the same time. As soon as the machine is 5 feet from the ground, instead of allowing it to land in its line of flight, it is placed as if to rise slightly and kept there by the elevating planes, thus checking speed very rapidly. The wheels will touch the ground at the same time as the tail does, the drag preventing the machine from rolling for any distance.

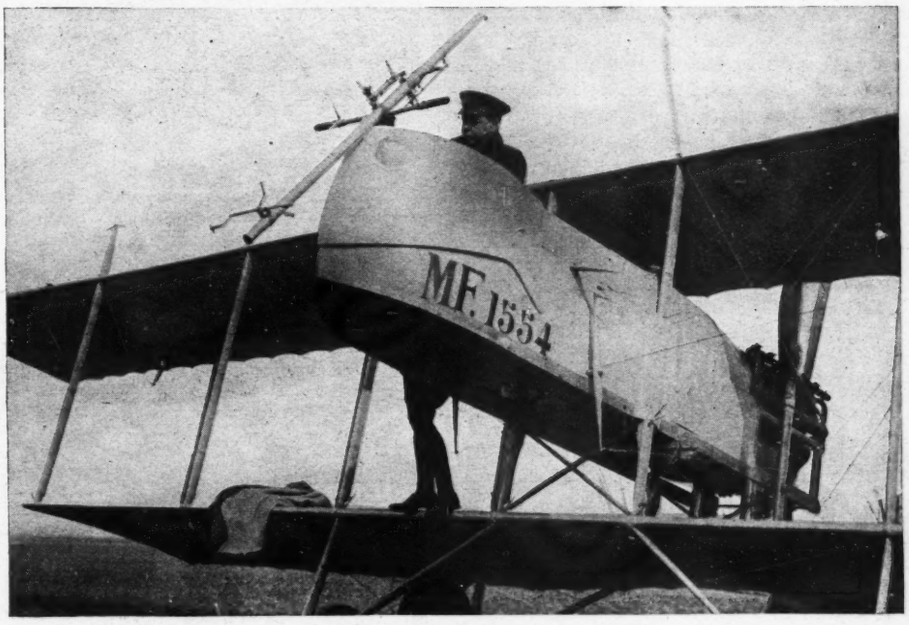
Airdrome Trip

A trip round the airdrome has to be accomplished in the fifth stage. This must be made at a height of about 330 feet. The machine should rise and make its turns in a progressive manner. In turning the machine should not be made to rise but its nose should be kept a trifle below that of the line of flight. A trip round the aerodrome should usually be made after 60 straight-line trials.

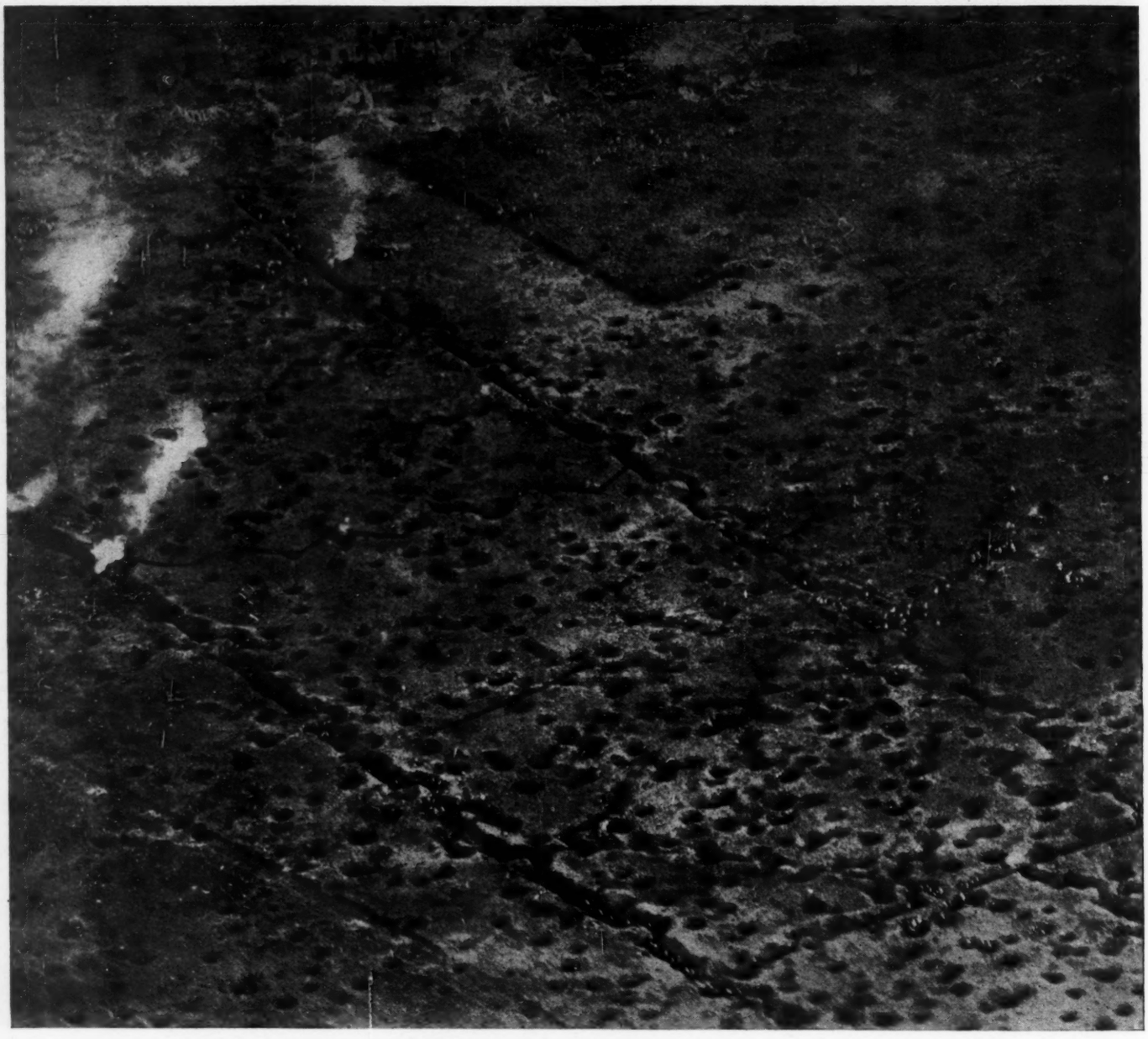
It will be seen that great care is taken to insure the student being thoroughly versed in his movements and familiar with all controls in each stage before passing on, no attempt being made to rush the pupil through. Up to this period all the training has been carried out on monoplanes of the cross-channel type, but now the pupil goes to a much larger and heavier machine equipped with a 50 hp. Gnome engine and having greater speed and climbing power. This class perfects the pupil in landing at higher speed, it teaches him to turn his direction in the air by fairly sharp turns, and to fly at altitudes of 600 to 2000 feet. The pupil also learns to work adjustments on the gas and air controls and to use the switch on long dives. In this class the student should make an average of twenty trips, following a fixed route set by the instructor.

In the following class use is made of a machine of the same general size, but with a still larger engine, usually a 60 hp. Gnome. Here he learns to perform long spirals, hairpin descents, etc., from heights of 3500 to 6800 feet, and having passed this stage successfully, usually after fifteen trips, is ready for the height test.

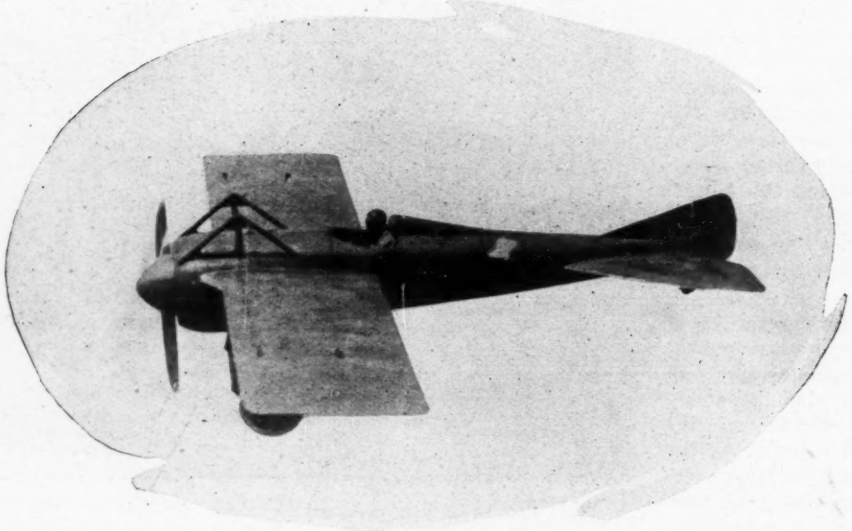
A barograph in a sealed case is hung round his neck, to the back, and he is expected to attain a height of 6600 feet, and

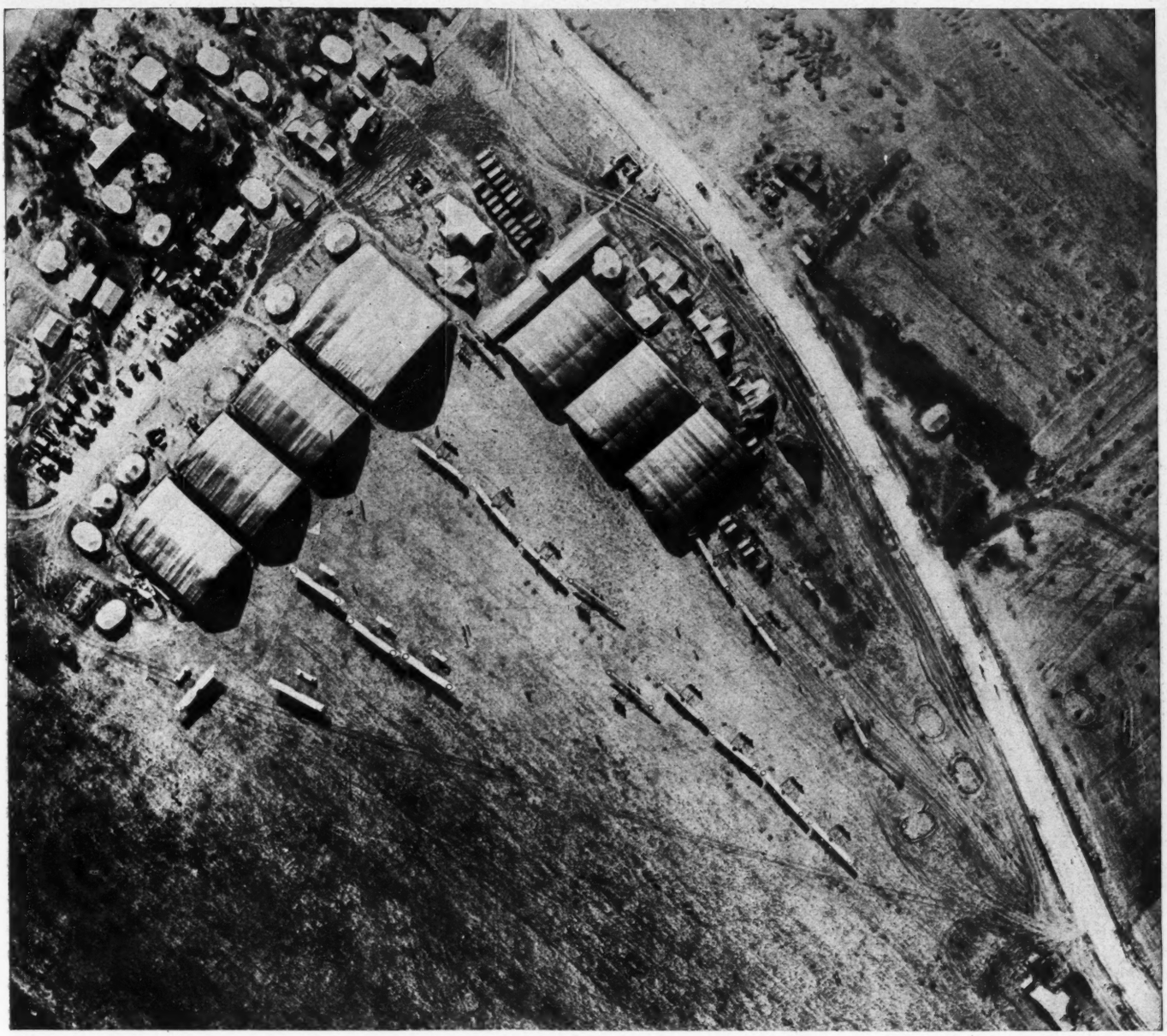


New non-recoil gun mounted on plane. This is the David, invented primarily for aircraft. Two-, 6- and 12-pounders are being built for airplanes



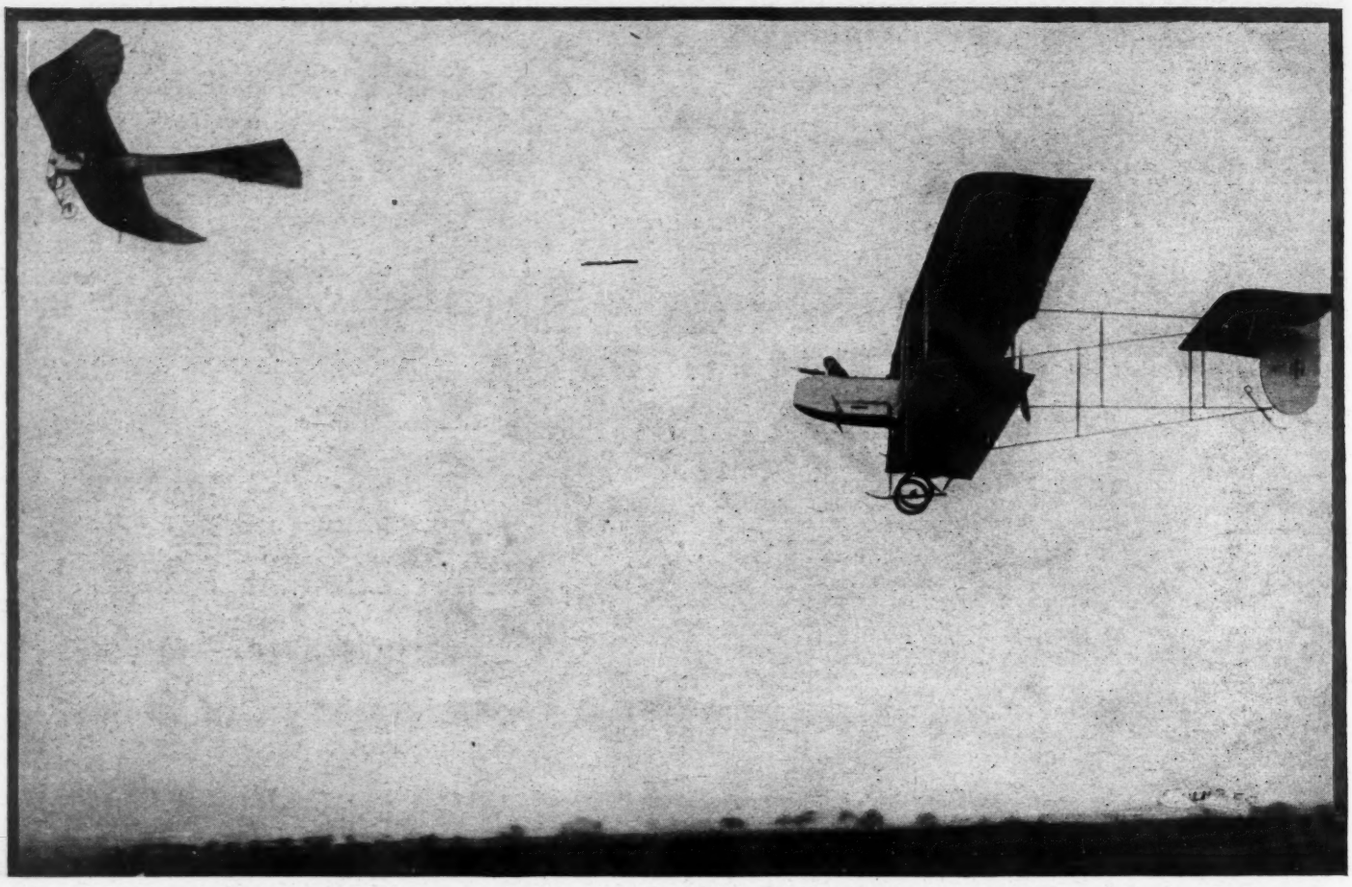
Soyecourt battle seen from the deck of an American's battle-plane. In the upper left of the photograph is Soyecourt burning. Toward the village are shown German troops flying before the French, who are hot after them. French soldiers are visible running up the trenches and jumping from shell-hole to shell-hole. French bombs are exploding in German trenches and on the field near the village. The lower illustration is of one of the speediest of the French airplanes. Its record is 125 m. p. h.





The picture of this French aviation camp was taken from an airplane and shows hangars and war planes. About them are motor trucks and cars and the tent homes

Even an airplane can't stay in the air always, and when it comes down it wants to find a machine shop handy, such as is shown at the left. It is a machine shop on wheels



This picture of a French airplane pursuing a German air scout shows the Dove, one of the German machines

having attained this to remain there for an hour. If for any reason beyond his control he is unable to remain at the minimum height for a full hour he may descend and finish the remainder of the time on a second attempt. After this he is ready for his pilot's test, which consists in flying cross-country over a triangle with an average of 190 miles, arriving and leaving from the military flying grounds indicated on the trip. For this test 24 hours usually are considered sufficient. Three of these triangles have to be made, each one over a different course. On the successful completion of these he is given his military pilot's certificate and the rank of corporal.

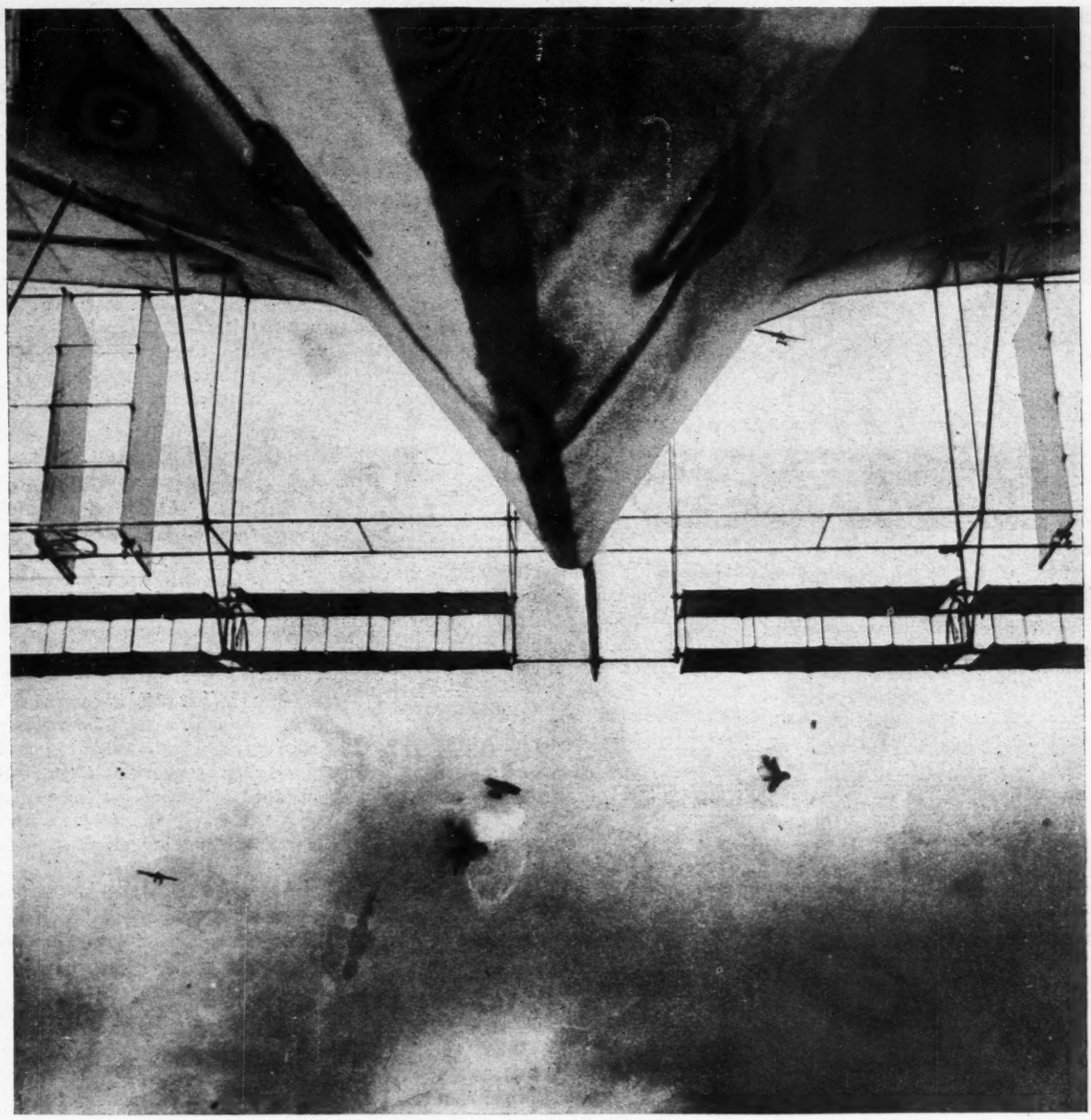
There are further stages in other schools, most important of these being aerial acrobatics. When Pegoud first showed the possibility of upside down flying, it was never suspected that this practice had an important military value. Yet, in an aerial battle in which scout machines are engaged the victory generally falls to the man who is most expert in such trick flying as spiral descents, high-speed nose dives, capsizes, banking on a wing tip and other exploits which only a few years ago would have been fatal to the man attempting them. Many of the best Allied pilots owe their success almost entirely to their dash and vigor, and the immense variety of stunts which, never being twice alike, confuse the enemy, and put him at a disadvantage. Instruction is given in the main operations, such as looping the loop, and very close corkscrew descents and sham fights, in which the men get at close quarters, are carried out at frequent intervals. In this class of instruction, however, much has to be left to the initiative of the pilot, each man being encouraged to adopt his own particular style rather than follow a stereotyped manner of fighting.

Machine gun practice is another of the higher stages of the instruction. Many of the scout machines are single-seater Nieuports with 150 hp. Hispano-Suiza eight-cylinder engine, and on these the man in charge has to be both pilot and gunner. Observation hardly enters into the role of these schools, for the observer is a man not called on to possess any great knowledge of flying but who must be an expert on all military matters, so as to be able to distinguish the different kinds of troops and the difficult calibers of guns at the heights of 10,000 to 15,000 feet, at which most observation flights have to be carried out.

IT should be understood that all American cars are trained for the best positions in the aviation service—for the post of pilot of an "avion de-chasse," as the fast single-seater scout machines are termed officially. In this work individual ability has its greatest opportunity, and though the risk is great, the possibilities of advancement are high.

While the pupil is training for his pilot's certificate he receives theoretical instruction and is encouraged to spend a few weeks at the airplane engine factories to obtain a thorough knowledge of the engine he will have to handle at the front.

Under the scheme of instruction adopted rejections are few, though the pupils vary enormously in ability, physique and the nature of their preliminary training. Young men who have had motor car experience and have practiced outdoor sports generally provide the best material. It is a somewhat curious fact that first-class motor car race drivers do not always make first-class air pilots. Many men who are noted for their recklessness on the road or track, find it impossible to gain confidence in a machine built of wood and canvas and unprovided with brakes. Other good race drivers find that the absolute and immediate response they obtain from motor car controls unfits them for the slow response of airplane controls. On the other hand, men who have had comparatively little motor car experience, and who have never given any signs of daring or recklessness sometimes prove the most dashing of aerial pilots. One French race driver who was noted for his daring on the road could never free himself from the impression that his machine was going to break up in the air. Another man, who proved a very apt pupil and gave promise of becoming a skilled pilot, lost his nerve while on his last cross-country test. He



The photograph above was made from the bridge of a zeppelin, looking toward the stern. In the distance are three airplanes. The two white puffs are exploding bombs dropped from other airplanes

was near the end of his third flight and would have obtained his certificate in a few more minutes, when he came down in a field, landing quite normally, rushed to the telephone office and told his officer that he was through with flying and wanted to be sent back to the trenches. Such cases, however, are rare, the construction of airplanes and the art of flying having developed to such a degree that skilled pilots now can be turned out with as much regularity and as much certainty as skilled drivers of motor cars.

Although not a part of the ordinary pilot's course, instruction now is given in the handling of big fleets of airplanes aloft. Whenever a bombing expedition is decided on the bomb-carrying machines always are accompanied by fast scouts, capable of more than 100 miles per hour, whose mission it is to engage any hostile forces which may be sent out. As an instance of the big scale of operations, during one German attack on a Continental city more than 100 airplanes went out to meet the invaders. Information regarding this proposed attack had been obtained by the intelligence department, and on the night the German machines were due to arrive, the whole of the aerial force of the attacked city went out, together with the force of a neighboring city. The scouts went ahead of the heavily armed machines and met the scouts of the invading force. A fight ensued, and the invaders, realizing that their secret had been surprised, warned the bomb-dropping machines which were coming up, and the whole force sheered off. Altogether there must have been in the air on that occasion 150 airplanes.

IT is a somewhat curious fact that first-class motor car race drivers do not always make first-class air pilots. Many men who are noted for their recklessness on the road or track find it impossible to gain confidence in a machine built of wood and canvas and unprovided with brakes.

One of the serious problems which has had to be faced by airplane engine makers is the loss of power at high altitudes. Observations generally are made at 10,000 feet, but most machines now are capable of flying at 15,000 feet, and heights of from 20,000 to 21,000 feet frequently have to be made on active service. It has been most important to get accurate data on power developed at the heights at which airplane engines have to do most of their work. With this object in view, engine manufacturers have taken the entire equipment of their test shops to the top of mountains 7,000 feet above sea level and have carried out their tests which they

have compared with similar tests made in their shops at practically sea level.

One important firm took its entire laboratory staff, an electric brake and all its test shop equipment to a height of 8,000 feet, twenty trucks being necessary to carry the men and material. They remained on the mountain fifteen days, during which they carried out every kind of test and obtained most elaborate data. On another occasion twelve manufacturers united to carry out similar tests on the mountain, these occupying an expert staff for more than a month. In general, it was found that at 8,000 feet above sea level there was a falling off of 20 percent in the power developed by the engine. By increasing the compression, by giving much greater ignition advance and by carbureter adjustments, giving a greater amount of air, the whole of the loss was regained.

Carburetors Make Problem

A large amount of work has been done in carbureters. Obviously a mixture which is satisfactory at sea level is unsuitable for the rarefied atmosphere at 10,000 feet. Alpine touring already had shown this, but the conditions on an airplane are very different from those on motor car. A further problem was to provide a suitable type of variable cooling and a carbureter which would give full power at extremes of temperature. Variable cooling is so difficult to obtain that its utilization has been abandoned as far as possible, the aeronautical authorities preferring to work on the lines of a carbureter which would give a correct mixture under a very wide range of temperatures. A fast scout machine, for instance, will climb to a height of 20,000 feet in an hour, during which time the cooling water is liable to rise to 150 deg. F. A quarter of an hour later it may have dropped to a few hundred feet and the engine have cooled off to 40 or 50 deg. It has been possible to get carbureters, which, after such rapid cooling, would allow the engine to pick up instantly and develop full power without any hesitation. This is done without any arrangement to preserve the cooling water at a good average temperature.

Radiator thermometers are used somewhat extensively, particularly for twin engine machines, where it is important that the two powerplants should be kept as closely as possible in the same condition. The general plan is to take the temperature of the water at the outlet from the cylinders and not in the radiator. This is particularly necessary where two, three or four engines are used with a common radiator.

During exceptionally cold weather trouble has been experienced on air-cooled engines with the freezing of lubricating oil, and on water-cooled engines with the freezing of water in the pump and pipes. Oil freezing takes place in the pipes while the machine is in the air, unless very careful provision is made to protect these pipes from the draft of the propeller.

U. S. Is First at Plants

Makers Promise Government's Orders First Consideration in Shipment

Middle West Factories Prepare to Give Entire Output

CHICAGO, April 9—The declaration of war has found the motor industry prepared and ready to put forth its every resource to the aid of the country. The machinery of every plant has been enlisted and indexed so that the Government knows just what it can obtain and how quickly. Some of the makers already are turning out munitions, airplane engines, trucks and other war needs which their plants make them especially fit to produce.

A certain secrecy is maintained, and for this reason the full extent of the military preparation made cannot be given. But it is known that one of the large parts companies is making shells; at least three of the motor car factories are making munitions in a small way to train the men and have machinery in readiness; another manufacturer has an airplane engine which is to be made in large quantities; and other factories are engaged in similar activities.

Organizations Co-operate

The 101 members of the National Automobile Chamber of Commerce pledged their fullest co-operation several weeks ago. The Society of Automobile Engineers, through a division of its Standard Committee, has been co-operating with the War Department in drafting specifications for army motor trucks, and these specifications even now are on the desk of Secretary of War Baker, waiting for consideration.

The factories of the Middle West, too, are ready to give the Government the aid of their resources. The motor car and parts producing factories in the territory around Chicago are alive to the value of their services to the Government and have offered all or part of their equipment to the Government at any moment that they are needed.

One of the largest passenger car and truck producers has offered his entire output. Dealers and customers have been notified that a Government call will receive preference and that other orders will be canceled if necessary. Some factories are encouraging the enlistment of their men, and practically all give their men assurance of consideration in the way of employment on their return from the front.

The Moline Automobile Co. has had good schooling in the manufacture of munitions during the last year, having made 8-in. shells for the British government at the rate of 300 a day. The contract has expired, and the plant is at the immediate disposal of the United States. President W. H. Vandervoort is a member of the special committee on standardizing munitions for the Government and of the preparedness committee of the S.A.E.

The Buda Engine Co. has offered its entire output. It has notified all customers that the Government will have precedence over all orders. It considers that the present disposition of its product is of immediate service value since much of the Buda firm's product is going into vehicles that will be of use to the Government.

The Waukesha Motor Co. holds the same view. Waukesha engines are going into farm tractors, and assuming that horses will be drafted into cavalry service in the proportion that they have been used in Europe there will be increased need for farm tractors.

Indirect Aid of Value

The officials of these engine manufacturing concerns believe this indirect assistance will be of the greatest value, though both are ready to direct their output wherever the Government advises.

The Chicago Pneumatic Tool Co. can furnish 1-, 1½- and 2-ton trucks on very short notice. This company has been making munitions for more than a year.

Several factories that desire to have their names withheld are among strong German communities, and in these stringent measures are being taken to guard against tampering. One of the larger factories has installed a lighting system on the outside of the factory, strengthened its force of watchmen and organized a detective bureau from its employes.

The Four Wheel Drive Co. is building thirty-seven trucks a week for the Government and is arranging to increase the output to meet probable increased Government demands. The concern has promised to produce 200 trucks a month for the Government if neccessary.

The Wisconsin Motor Mfg. Co. is furnishing many engines for trucks to truck builders who are working on Government orders. Aviation engines are being turned out, and the production can be increased to one a day on demand. It is understood unofficially that the Standard Oil Co. of Indiana and other refiners are accumulating stocks of fuel at the Government's suggestion.

ARMY TRUCK SITUATION

Washington, April 6—Purchases of many motor trucks and, possibly, passenger cars will be made by the War Department as soon as it can get information as to extent of the army now in process of being built under the call of the President for an army of at least 1,000,000 men. The quartermasters' corps, the purchasing body of the War Department, plans to equip the various divisions by divisions as rapidly as they are obtained and mobilized. Details as to such purchases have been worked out, and while no actual contracts have been let, the matter of the purchases is in such shape that the contracts can be pushed through rapidly.

The recent activity in Mexico and along

the Mexican border resulted in the building up of quite a motor truck equipment, and the army now has, according to Col. Chauncey M. Baker of the quartermasters corps, 2600. This number is sufficient to take care of the needs of the army now.

The Department not only knows what it will need but it is well informed as to the facilities for getting the motor equipment. It knows where to go and what may be expected of a certain factory. Discussing the purchases in prospect, Colonel Baker said that in view of the fact the United States manufactures six times as many truck and passenger cars as the rest of the world, this government has no doubt of its ability to get quickly and satisfactorily what it will need from time to time as the army is built up.

JOY AVIATION FIELD OFFERED

Detroit, April 6—Joy field, owned by Henry B. Joy, has been offered to the U. S. Government for aviation training through Sidney D. Waldon, president of the Packard company. The field was inspected in 1915 by U. S. aviation officers, and a favorable report was made. The Packard company has been testing its aircraft engines there.

Fifty aviators could be trained there each nine months. Several of the racing drivers who have enlisted in the aviation corps as a squadron want to train on it. The equipment of the field is being considered by Mr. Joy, Gregory Flynn, representative of the drivers, J. D. Vincent, Packard vice-president, and W. B. Stout, Packard aircraft engineer.

FISHER OFFERS AIRPLANES

Indianapolis, Ind., April 6—The offer of Carl G. Fisher to give the army aviation department the use of the Indianapolis speedway as a training camp for aviators has been enlarged by his more recent offer or airplanes to the department. He calls attention in his telegram offering the airplanes to the hundreds of motor car testers in Indianapolis who would make the best possible material for aviators in time of war. The aviation department is anxious to accept the offer but has postponed acceptance pending action by Congress on a bill to provide funds for the establishing of aviation training camps.

TRAILER FOR AMBULANCE CORPS

Kansas City, Mo., April 6—While few purchases of motor equipment have been made for the national guard, many dealers are watching the situation closely, ready to supply equipment or to assemble the trucks or cars of customers with which they keep in close touch. There seems an especial interest in trailers and truck attachments, and it is quite likely that many will be bought by individuals or subscription for the various companies or corps. One organization has already bought a trailer and presented it to the ambulance corps.

Trucks Ready for War

Michigan Makers Can Produce Between 200 and 300 Daily with Present Capacity

Government Has Statement Showing What Can Be Done

DETROIT, April 7—The combined capacity of all Michigan companies engaged in the manufacture of trucks now is between 200 and 300 trucks daily, and these factories are holding themselves in readiness for war operations, which probably would raise this total in a short time. There are about 1000 trucks immediately available.

General Motors has 260 trucks on hand held up by the freight situation, and is producing twenty daily. Republic turns out seventy-five daily, and is working 20 hour shifts. It has 300 trucks stored in Detroit, and 2000 among dealers. Commerce is making fifteen trucks daily, and has a large stock of materials, though no trucks, on hand. It belongs to the National Security League, and is ready to turn over the entire plant and material to the government at once.

Packard is making twenty-five trucks daily, and has none on hand unsold. It could turn over several hundred, though, if needed. Signal has thirty trucks on hand, and is making four daily. The Acason Truck Co. is making three a day. Federal is making fifteen a day. It and Packard are engaged in work of a secret nature now. Packard will concentrate on airplane engines, following tests next week. Denby is making twenty daily, and has 100 on hand.

All makers have made statements to the government, telling what they can do, and lists of the trained drivers in the different factories already are in the hands of the War Department.

TRUCK STANDARD AGREED ON

Washington, April 6—A standard for motor trucks for army purposes has been agreed upon between representatives of the Quartermasters Corps of the Army and representatives of the Society of Automobile Engineers and is now before Secretary of War Baker for his approval. The approval of the Secretary is expected as soon as he reaches it on his desk. The standardization of motor trucks is taken up each year by the War Department, due not only to changes which are constantly being made in the design and manufacture of trucks but also to the special needs of the army as developed by experiences in the actual use of the trucks.

The standard just approved and sent to Secretary Baker will apply to the present year. Whether the war in which the United States has entered lasts beyond this year or not, a new standard will be adopted for 1918. In seeking a standard for the army truck, the National Automobile Chamber of Commerce and the A.A.A. cooperated with the government's officers and the S.A.E. From the latter organization, Coker Clarkson headed a committee which met here last Friday to take up the question of standardization.

Several points were at issue between the manufacturers and the joint committee working directly on behalf of the government in a decision on the question of standardization, but these finally were worked out satisfactorily to all interested. As soon as the new standard is reviewed by Secretary Baker it can be used by manufacturers in the construction of trucks which may be begun in anticipation of the heavy demands of the government a little later.

350 RACERS SIGN UP

New York, April 9—The list of racing drivers who have signed up for governmental work during the war has been increased to 350. These are about even in their selection of the two departments, the aviation and the armored car division.

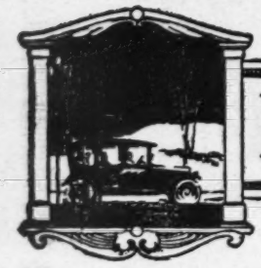
CUT PRICE HELD LEGAL

New York, April 10—The right of a retail merchant to sell a patent article at cut price was held legal yesterday by the Supreme Court of the United States. A dealer may now sell patented articles at any price he sees fit. The Supreme Court also held that a patentee cannot dictate what shall be used in his machines. That is, patent grants for machines give others the right now to use these machines subject to the patent right with any appropriate material or supplies.

N. A. C. C. TAKES SCHOOL

New York, April 6—So that more and better draftsmen can be supplied to the makers of motor car bodies the National Automobile Chamber of Commerce has taken the Technical School for Automobile Draftsmen and Mechnics in charge and has broadened its own scope. The school has been conducted for thirty-seven years in this city. Graduates are connected with practically all the prominent motor car and body-building plants in the country.

Charles Clifton, president of the Pierce-Arrow Motor Car Co.; H. H. Rice, treasurer of the General Motors Co.; and Alfred Reeves, general manager of the N.A.C.C., have been added to the committee in charge of the school, of which Daniel T. Wilson is chairman. The committee plans to double the size of the school during the next year by additional equipment and by the larger quarters offered by the Mechanics Institute.



EDITORIAL PERSPECTIVES

Uncle Sam, Can't You Use Us?

IS there no place for the motorist and his car in the general scheme of America's defense? Our country possesses what would seem to a layman's eye to be a most valuable ally to its naval and army program of operations in the 3,000,000 motorists who stand ready, almost to a man, to offer themselves and their cars for any use in which they may be effective in this national crisis.

TO-DAY'S news that a motor transport reserve committee has just been appointed by the Council of National Defense with the leaders of the motor organizations at its head to arrange for utilization of trucks and cars will be welcomed by motorists, for it seems there should be some niche in which motorists as a whole, and as motorists, could be utilized. True enough, wherever the opportunity is offered, the motorist has come forward with his car gladly and in the very restricted service that has been permitted him, he has proved valuable.

EVERY city of any size within the last two weeks saw car after car carrying recruiting officers and banners—and, frequently, some fair enthusiast with a megaphone in the endeavor to build up in a day an army and a navy that should have been in the process of formation years ago. True, also, that motorists have been the chief means of distribution of the patriotic slides that appeared in all of our motion-picture theatres within the last few days. But all of these efforts have been haphazard and spasmodic; they have lacked organization. The motoring organizations of the country and of the different cities have informed themselves as to the availability of their members and their members' cars, but any assistance they have been able to give so far has been chiefly in recruiting.

THAT the motorist on the street responded gladly to any suggestion as to how he may help was most most forcefully brought out last Saturday when one of the patriotic organizations in Chicago sent a hurry call to the different motoring clubs of the city asking for cars for the distribution of recruiting slides to the moving picture houses in the city. Not only did the club members respond in force, but they sent men out on the boulevards to hail motorists as they drove to their business. Nearly every motorist who was stopped on the boulevard, without reference to club affiliations, gave up his afternoon plans and reported at headquarters for orders. Similar object lessons in the motorists' patriotism are given in every city.

IN New York City motor truck owners in particular assisted greatly in the mobilization of the militia and national guard, carrying troops and their impedimenta to some indefinite point "somewhere in New York." Motorists of several of the states and cities have organized so far as possible under the existing regulations of their separate states. These ordinarily take the form of a motor reserve corps.

Motor Reserve Corps

OWNERS of motor cars in New York state, in California and in Illinois have attempted to organize themselves in the last two years in some way to be of assistance, if not in actual warfare, in transportation of troops and supplies. Only in California has this movement reached any degree of success —simply and solely because of the states mentioned California is the only one in which any provision has been made for co-ordinating the civilian motorist with the work of the military forces.

IN California, the success of the motor reserve corps has been pronounced and should serve as a model to civilian organizations of the sort in other states. Indiana now through the Hoosier State Automobile Association is organizing a volunteer corps to act as an unofficial though recognized auxiliary of the Indiana National Guard. In very few states, however, is there legislation which permits of such co-operation in any official or semi-official way.

WITH the exception of the Marine Corps, there is no arm of the Federal service, so far as it has been able to determine at this time, that has any arrangement by which motorists may learn how to be of service as motorists. There is no way in which they may co-ordinate in a body with the military or naval authorities.

NEXT WEEK

"Without gasoline it would be impossible to carry on the war on a fraction of its present scale; yet there are sections of the front which have remained, and probably always will remain, closed to gasoline vehicles. Half a dozen of us, with an hour's time to kill in an advanced post, tried to imagine the war in Italy without the gasoline engnie. We reduced it to an affair of outposts occupied by a few hundred men—then gave it up as impossible."

Thus writes W. F. Bradley in his story on "How Motors Help the Army," which will be published in MOTOR AGE next week. Mr. Bradley was in the Italian ambulance service on the Italian-Austrian front four months. In this time he had the best of opportunities to study first-hand the use of cars and trucks by the Italian army.

How Can the Motorists Help in Their Country's Defense?

THOUSANDS of car owners have answered their country's call by enlisting in some one of the different branches of the military and naval forces, and more are doing so every day. However, there probably is a very large percentage of motorists who, by reason of their age or the fact that they are engaged in pursuits in which their greatest use to the nation would not be given by carrying a rifle at the front, are at a loss as to how they can serve their country most effectively.

THE greatest need of the nation at this time is for its citizens to realize the importance of proper organization and training. Proper organization does not mean in every case that men, no matter how patriotically inclined and how willing to serve their country, should bury their talents and previous training in work at the front that might be better performed by a day laborer. The need of the nation now is that the government may have the information necessary for it to determine where its citizens can best serve and the guarantee that they will serve in any desired capacity at call.

America's present condition of unpreparedness for the world conflict in which it finds itself engaged may be laid at the door of the idea legislators have cherished that when the time comes for the defense of the country millions of men will spring to arms ready to withstand the threatening foe. The legend of the embattled farmers taking their old muskets from over the chimney piece and defeating the invader may have been true at the time of the revolution. Today it has been proved an absurdity. The last few weeks have shown that to secure voluntary enlistments of a million men is an improbability. To raise an army of that number promptly, without some form of conscription or universal service, is impossible.

No matter how patriotic and willing to serve the ordinary American citizen may be, his value as a fighting unit is comparatively light until he has become trained. This never has been better stated than it was by James W. Gerard, former United States ambassador to Germany, in his recent address to the Aero Club at New York, when he declared that modern war is largely a matter of mechanics and munition. "Nowadays the old flintlock means zeppelins, airplanes, captive observation balloons, steel helmets, gas and gas masks, machine guns, searchlights, 16-in. guns and 18-in. howitzers, trench mortars, range finders, telescopes, armored motor cars, tanks, miles of barbed wire, underground mines, rockets and grenades, and countless other instruments of war, the proper use of which can only be learned after years of hard application."

Air Motors from Willys

Overland Accepts Contract from Curtiss to Make 4500 Aviation Engines

Order Will Not Affect the Regular Production of Concern

TOLEDO, Ohio, April 10—Special telegram—The Willys-Overland Co. has accepted a contract from the Curtiss Aeroplane Co. to manufacture 4500 Curtiss airplane engines for the United States Government. These engines will be made at Elyria, Toledo and Elmira. Work is already under way for the manufacture of the special tools necessary to fulfill this contract. This airplane manufacturing in no way will hinder or reduce the regular produce of the Overland.

PACKARD STARTS DELIVERY

Detroit, Mich., April 10—The Packard Motor Car Co. already is making delivery of trucks to the government, but this fact is not hampering the manufacturing of trucks for the consumers.

TO HELP DIRECT ADVERTISING

Detroit, Mich., April 10—Harry W. Ford, president of the Saxon Motor Car Corp., has been appointed a member of the National Advertising Advisory Board which will have charge of government advertising during the war.

STUTZ MAKES WAR GIFT

Indianapolis, Ind., April 9—Harry C. Stutz, president of the Stutz Motor Car Co., today donated to the Indiana National Guard its first motor equipment. In behalf of the company he gave the state's military organization six Stutz chassis constructed specially for ambulance purposes. The Parry Mfg. Co., this city, has agreed to build the bodies, the total gift to the state being valued at about $15,000. Mr. Stutz not only offered the chassis, but has promised to assist in recruiting thirty first-aid men to accompany the cars. Men in the Stutz factory already have agreed to join a company to become drivers of the cars and enough additional men have agreed to enlist to complete a company.

HOOSIERS START MOTOR RESERVE

Indianapolis, Ind., April 9—The Hoosier Motor Club of this city, desiring to place its membership in the services of the country, today announced a plan for organizing the motorists of Indiana into a motor reserve to be an auxiliary to the Indiana National Guard. The plan has been authorized and sanctioned by Adjt. Gen. Harry B. Smith of the Indiana National Guard. It is the purpose of the club to have motorists enroll so that in an emergency it would be unnecessary to wait for rail transportation in moving the national guard. An appeal to motorists is being made on the grounds that motor transportation would be most valuable in case of such danger as might arise through invasion of the South. Motor reserves have been organized in New York and California, after which the Indiana organization will be patterned. The only requirement for membership is that the motorist sign the enrollment blank, agreeing to obey orders in times of emergency.

U. S. TRUCK SHOWS LOYALTY

Detroit, April 9—Headed by officials of the company and escorted by a body of state militia, officially designated more than 500 men and women, employes of the United States Motor Truck Co. of Cincinnati, held a patriotic parade in Covington, Ky., where the factory is located, April 7, immediately after word was received that President Wilson had signed the declaration of war.

The parade was witnessed by thousands of Cincinnati and Covington citizens and was more than three city blocks in length.

ARMORED CAR AS GIFT

Baltimore, Md., April 6—The King Motor Sales Co., Inc., this city, has headed a public subscription list to purchase a light armored motor car for presentation to the Maryland militia. The car to be presented is manufactured by the King Motor Car Co. and the Armored Motor Car Co. of the same city. The latter concern recently filled an order for five of these light armored cars for the United States Navy.

The armored car is mounted on the standard King eight-cylinder chassis and is armed with defensive armor and a machine gun mounted in a revolving turret. The gun may be either a Lewis, Vickers or Benet rapid fire gun. Each car carries three men,—a driver, gunner, and mechanic, the latter acting either as assistant to the driver or gunner.

MOTT MOVING TO JACKSON

Jackson, Mich., April 7.—Within sixty days the Mott Wheel Works, now in Utica, N. Y., will be in operation at Jackson, Mich. This will bring the Perlman part of the Mott Wheel Works to Jackson, also, and that will be added to the Perlman Rim Co. plant in that city. The balance of the $80,000 needed to bring the Mott plant to Jackson was raised early this month. It is reported that arrangements practically have been completed through the courtesy of the Briscoe Motor Corp., by which that company will surrender the former Ames-Dean plant on Wildwood avenue to the new corporation.

MEXICO MARCH IMPORTS 775

Washington, D. C., April 6—Seven hundred and seventy-five motor cars were imported into Mexico during March as a result of the act of the de facto government removing import duties from all classes of motor vehicles.

Coffin May Get Portfolio

Washington Rumors Make Him Secretary of Munitions in War Cabinet

Work for Preparedness Adequate Qualification for Position

WASHINGTON, D. C., April 6—Howard E. Coffin has done more than any other man in the motor car industry in the work of preparedness, and rumors around the capital are that he undoubtedly will be appointed Secretary of Munitions in President Wilson's war cabinet when such a portfolio is created. Besides giving his time practically exclusively to this preparedness work Mr. Coffin has spent large personal sums on the work.

Most of last year he maintained offices in New York, where he directed the work of compiling an industrial index of 30,000 manufacturers. A sixteen-page questionnaire was sent to these 30,000 manufacturers, who were scattered through every state in the Union. More than 27,000 replied, and all the information has been segregated in a card index which makes the information instantly available. The complete machine equipment of all factories of any and all kinds, as well as other valuable information, has been compiled in this way.

The information makes it possible to find out in a few minutes how much ammunition of a certain size could be made in all the factories in Connecticut, in Illinois, in Michigan and in every other state.

Mr. Coffin has kept in close touch with the makers and distributors of munitions in Europe and is adequately qualified to assume such a portfolio.

CAMP FOR AVIATORS

New York, April 6—A large training camp for aviators is to be established on Long Island near this city by H. P. Davison of J. P. Morgan & Co., who will equip a plant to train 100 men.

NEW ENGLAND VOLUNTEERS

Boston, Mass., April 7—New England motorists have responded to the call for aid very well so far. Some weeks ago Massachusetts organized a Safety First Committee, and Chester I. Campbell, secretary of the Boston Automobile Dealers' association, was placed in charge of trucks and cars. He sent out a call for machines and received many replies. Then the Bay State A. A. held its banquet and passed around slips asking for cars or trucks from the members, and many volunteered. These were sent to the committee and turned over to Mr. Campbell. The Springfield A. C. did the same. About 2500 cars and trucks have been volunteered. These are being tabulated so that duplicates can be eliminated.

The Main State A. A. began a campaign to list every motor vehicle in the state, and the result is that they have succeeded in getting many volunteers for service. Connecticut has a full list, not only of its cars and trucks but of men who can operate them and keep them in shape. The idea is spreading to the other New England States, and the government will have available thousands of cars and trucks in short order.

Many women have volunteered their machines, and they are working now for the state in Massachusetts. A women's motor corps has been formed in Boston and they wear uniforms and drive their own cars. No woman is eligible unless she possesses a chauffeur's license, which means passing a road test, and she must also be able to make repairs and put on tires.

The Safety First committee is to have pennants and shield made so that people who volunteer may use them in their work and not be held up when going to forbidden areas.

$10,000,000 MERGER IS OFF

Detroit, April 7.—The special meeting of stockholders of the Michigan Stamping Co., scheduled for last night to consider a merger with the General Engineering Co. in a $10,000,000 corporation has been postponed indefinitely. The plan has been abandoned for the present.

STUDEBAKER ELECTS

South Bend, Ind., April 9—The annual stockholders' meeting of the Studebaker corporation, April 2, was held in Jersey City, N. J. L. J. Ollier, M. F. Wollering and A. B. Thielens were re-elected directors. The vacancy of the board caused by the death of the late J. M. Studebaker, Sr., was filled by the election of J. M. Studebaker, Jr. The directors elected the following officers: Chairman of the board, F. S. Fish; president, A. R. Erskine; treasurer, C. C. Hanch; secretary, A. G. Rumpf; vice-presidents, J. G. Heaslet and L. J. Ollier; assistant treasurer, C. D. Fleming; assistant treasurer, George A. Fulmer; assistant treasurer, J. M. Peterson; assistant treasurer, W. P. Shillington; assistant secretary, John B. Marsh; counsel, F. P. Delafield; general auditor, H. E. Dalton.

War Census of Trucks

Chicago Automobile Trade Association Lists Owners and Vehicles

Dealers Compile Information for War Department

CHICAGO, April 10—A complete census of the motor trucks suitable for army service and drivers capable of handling these trucks is being made by the recently appointed mobilization committee of the Chicago Automobile Trade Association with a view to furnishing army headquarters with a list of trucks which owners will offer voluntarily for service and a list of drivers who voluntarily offer to enlist to drive these trucks.

The census is being drafted through the dealers. Each dealer lists his truck purchasers, and these purchasers are communicated with. If they express a willingness to relinquish their trucks for government service the complete specifications of the trucks as regards power, capacity, tire size, etc., is listed in the report which will be given to the army. Although the present census has to do with trucks only, a survey of the passenger cars will be made if conditions seem to warrant it. L. Markle, Studebaker distributor, is chairman of the mobilization committee.

KANSAS CITY STUDIES SITUATION

Kansas City, Mo., April 6—The participation of motor cars and trucks in war preparations will be studied in Kansas City by a conference committee of the Kansas City Tractor Club, the Motor Car Dealers' Association and the Implement Vehicle and Hardware Dealers' Association. The conference will assist in mobilization.

TEXAS SUES FORD COMPANY

Austin, Texas, April 6—States Attorney General B. F. Looney has filed suit in the district court here against the Ford Motor Co. for alleged violations of the anti-trust laws of Texas. The petition contains two counts, and statutory penalties at the rate of $1,500 a day covering a long period was asked.

It is alleged that the company, on or about July 1, 1916, entered into contracts with dealers in the state of Texas whereby the price of Ford cars was fixed and that the company has parceled out the state into sales territory and restricted the several dealers to sales within such limits. It is charged that the anti-trust law is violated in two respects, the fixing of restricted sales areas and the fixing of a price for the resale of the Ford cars.

CONNECTICUT MAKES INVENTORY

Hartford, Conn., April 7—Connecticut well might serve as an example to other states in the taking of a census of motor cars and trucks available for military purposes, an example which no doubt will be taken now that military purposes are to be so dominating in the United States. Each owner of a motor car or motor truck in the state of Connecticut received a questionnaire asking the capacity and other information, together with the telephone number of the owner.

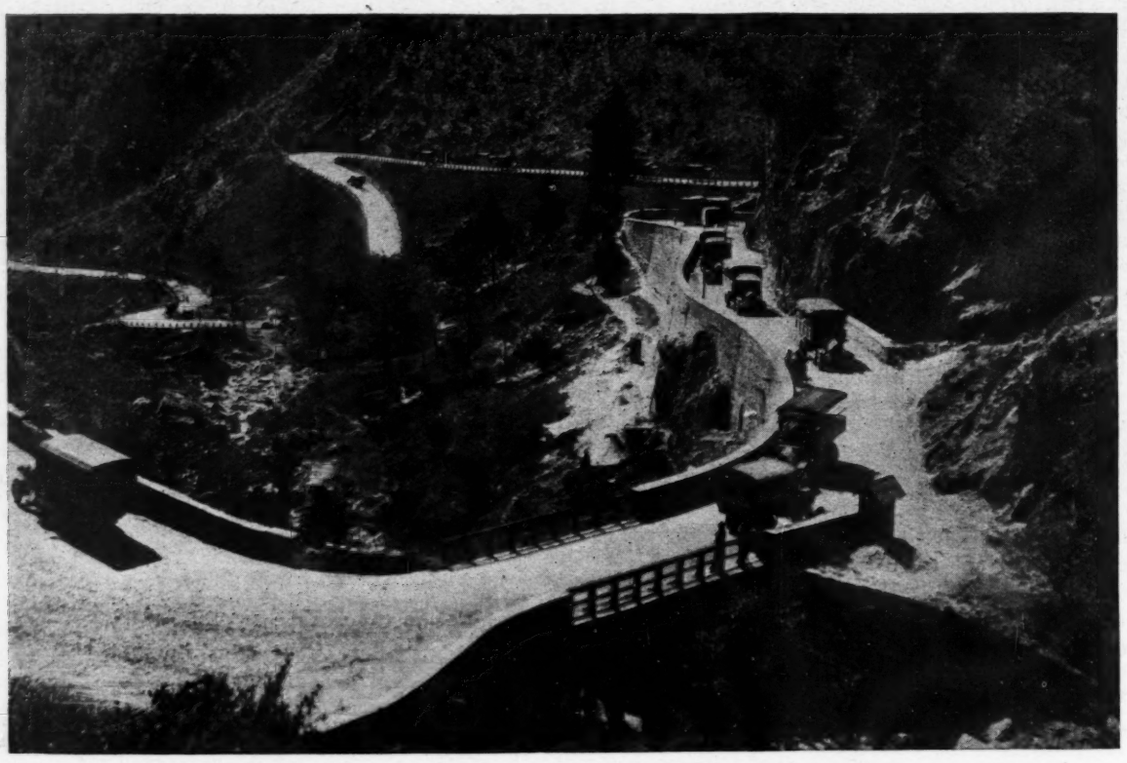
The offers of motor cars or trucks for service have been divided into these six classes:

Class A. Motor trucks to be ready at 2 hr. notice for three working days.
Class B. Motor trucks to be ready at 48 hr. notice for thirty working days.
Class C. Touring cars or runabouts to be ready at 2 hr. notice for three working days.
Class D. Touring cars or runabouts to be ready at 48 hr. notice for thirty working days.
Class E. Motorcycles to be ready at 2 hr. notice for three working days.
Class F. Motorcycles to be ready at 48 hr. notice for thirty working days.

The National Ford Owners' Club, 1777 Broadway, New York, has completed plans for mobilizing all Ford car owners who will volunteer their services in a national Ford machine gun corps. Registration of volunteers is being made. General Wood and Secretary of War Baker have approved the plan, declaring that a corps of Ford cars equipped with machine guns and supervised by army officers would prove invaluable for coast defense and other work.

These motor trucks are the ammunition carts for the machine guns of the Seventy-first New York National Guard

Building Roads to Battlefields



A fine example of Italian roads, where traffic regulation is of the utmost importance

Italian Army-Built Highway Example for Others

In Two Parts—Part II

By W. F. Bradley

MOST of the water for road-building is hauled by motor truck. Several special tank trucks with power-driven pump are in service, but as fine weather is apt to be interspersed with frequent heavy showers, it is found economical to fit up ordinary trucks as water wagons, whenever required. This is done by placing in each truck four barrels, the two front ones being connected to the rear ones and the two latter having an outlet to a sprinkler the full width of the truck. The conversion from ordinary truck to water wagon can be made in about half an hour, and unlike the special wagons these trucks need never stand idle.

Special Routing

Every effort is made to use out and home routes. This is more difficult on the Italian front than elsewhere, owing to the smaller number of roads, their narrowness and the greater difficulty of building them. But wherever two roads exist, one-way traffic is established, and in scores of cases new roads have been built to make one-way traffic possible. It is a very common practice to close villages to through traffic by opening up some road round the village; this avoids congestion in the narrow streets. One village comes to mind built on a ledge on the mountain side. Its main street was only just sufficiently wide to allow of the passage of an army truck, and to widen it would have entailed the pulling down of some substantial houses or the blasting of several hundred tons of solid rock. In this case, as in many others of a similar nature, two soldiers were constantly on duty with red and white disks and lamps, by which they sent traffic through first in one direction and then in the other. As a slight relief it was found possible to cut a narrow track a few yards higher up the cliff quite suitable for pack mules. Thus all the traffic was removed from the village.

Foreman of road gangs going to work over road flooded by a sudden storm

Expect Traffic Control

Road policing on the Italian front is done almost exclusively by the Royal Carbiners, a select body of soldiers who carry out difficult duties in a remarkably efficient manner. The traffic policeman at the front must have all the tact and experience of the city policeman in New York, Chicago or London and in addition must have a quick eye for spies, defaulters, joy riders, and undesirables. He has to be a traffic policeman and a detective at one and the same time. He has the right to hold up every vehicle, but if he did so traffic would be almost impossible; thus it is necessary for him to memorize the types of vehicles and their various identification marks at the same time. He has the right to hold up

every vehicle, but if he did so traffic would be almost impossible; thus it is necessary for him to memorize the types of vehicles, their various identification marks and the drivers' faces, so that he can distinguish at once between the men and the vehicles belonging to his district and those strangers who might be traveling without authority.

His task is complicated by the fact that he has to handle as much, if not more, traffic in complete darkness than in daylight. Without so much as an electric torch to assist him, he shall decide without any loss of time whether he shall hold up a driver and examine his papers or let him go through. The man may be on urgent business and if stopped both he and all connected with him will resent the delay; also he may have no business there at all, and if allowed to get through trouble would follow.

Bridge-Head Danger

The traffic policeman's duties are particularly arduous at the head of the various temporary wood and pontoon bridges crossing the river at points under shell fire. A notice at each of these bridges states the maximum load it will carry, this load being 4, 6, 8 or 10 tons. Although every driver is called upon to declare the weight of his vehicle and is held responsible for an under-estimate resulting in an accident, the traffic policeman also would be reprimanded if by reason of his lack of energy an accident occurred.

These bridge-head positions are frequently under fire, and it is only possible for the traffic policeman to remain on duty when provided with a substantial sandbagged dug-out. Naturally when the road is being shelled, no driver is inclined to loiter and indeed is generally apt to forget the rule that all bridges must be crossed at a walking pace with the mechanic on foot a few yards ahead of the car and all horses being led. There is a certain humor, not always appreciated at the time, in the sight of a chauffeur on a shelled road driving out and preparing to dash across the rough, crazy bridge at a speed far in excess of legal limits. Just as he turns into the bridge and calculates that with a little luck he will get across before the next missile is due to arrive, a head is thrust out of a hole in the ground and a voice yells at him.

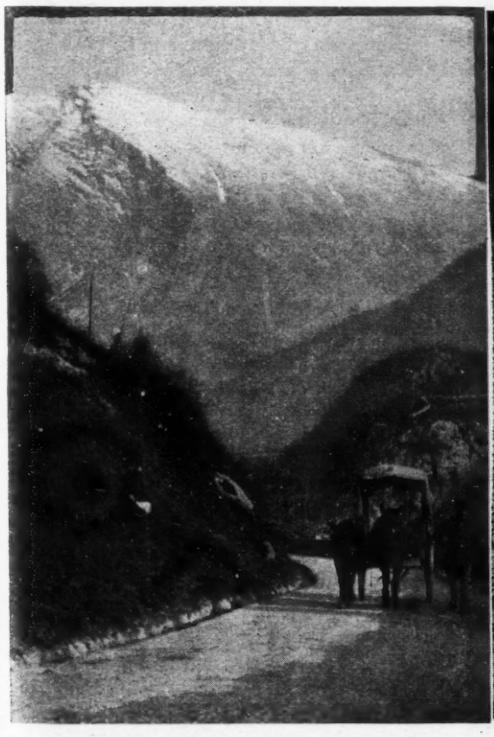
"Hi, there, go slowly."

Usually these bridges operate in pairs, one for ingoing and one for outgoing traffic. But if one of the bridges is hit and rendered impassable or blocked by a broken down truck or wagon, the whole of the traffic has to be carried by the one single-track bridge. In a few minutes perfectly organized and regular traffic can be transformed into a welter of confusion compared with which a trolley tie-up in lower Broadway is a desert. Before traffic can be diverted to another route, supposing another route exists, 2 or 3 miles of road will be choked with a mass of ambulances, trucks, artillery, wagons, pack mules and troops afoot. Pitch darkness prevails, for not even a match must be struck, and recognition is only possible by voice and general outline. When such accidents have occurred, it has not been uncommon for a motor car to take 5 hours in covering 2 miles. Every man in the pack knows too that the enemy might select that particular moment to drop in a few shells and that even a single shell would entail terrible slaughter. Under such conditions everything depends on the intelligence and energy of the traffic police.

In some cases it is economy to drop a loaded truck right into the river or lever it off the road into the ditch, rather than hold up hundreds of vehicles in a position liable to be shelled at any moment. An intelligent and experienced policeman will be able to decide at once whether any particular accident is likely to hold up traffic for a few minutes or for several hours and act accordingly. A few ambulances, with serious stretcher cases aboard, turned into a traffic block while a longer but clearer route was open might entail the loss of several lives.

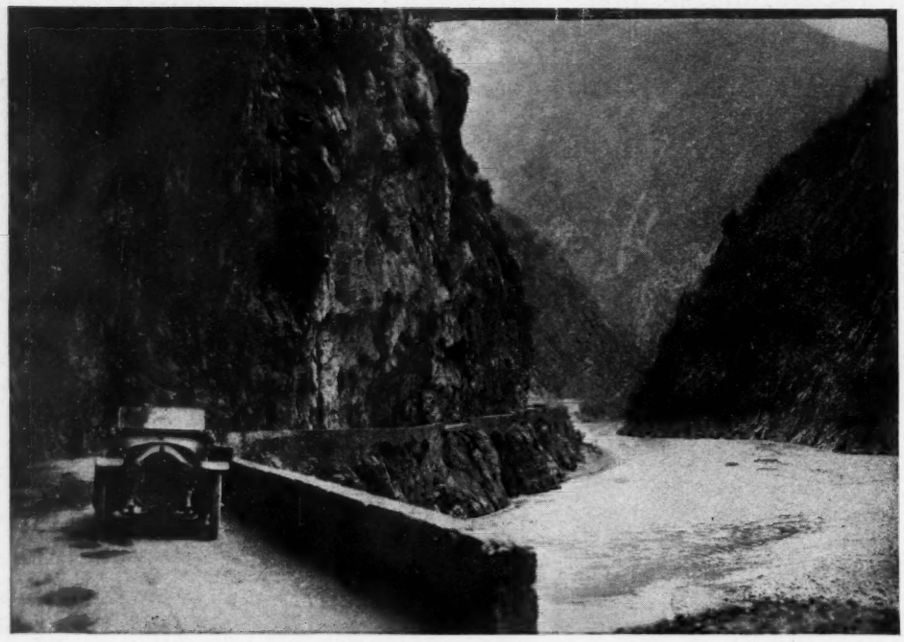
Motor Car Traffic First

On the front motor car traffic takes preference over all other. Fast trucks take preference over slow trucks, staff cars have the preference over convoys, and loaded ambulances have the right of way before all. This preferential treatment in favor of motor cars is administered in a very intelligent manner by the Italian army traffic police. If a horse convoy is approaching a bridge or a narrow section of road, with motor cars coming up behind, the horses will be held back until the cars are ahead. If a long mule column is about to cross by a pontoon bridge and several motor cars are seen down the road, the animals are held back until the mechanical transport has got ahead. At many points light bridges are built for pack mules only. In the thousand-and-one cases which arise on the road daily, when one party must

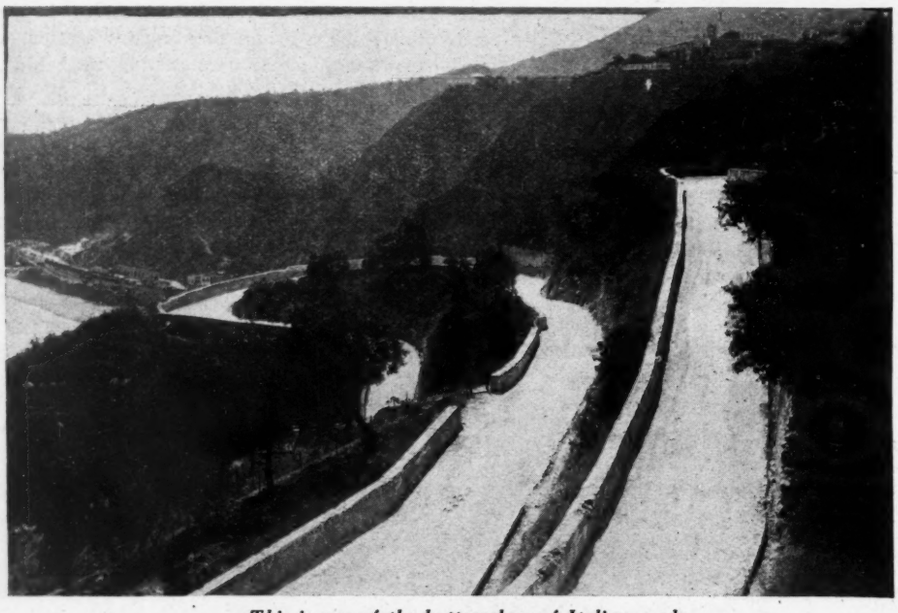


This is a good example of an Italian mountain road such as has been built by the army forces in the last two years

While roads can be damaged by shell fire, railroad tracks can be utterly destroyed. This scene is near Gorizia railroad station and the photograph was taken just after that city was captured



A mountain road of this nature is difficult to build, easily defended, and cannot be widened except at immense cost



This is one of the better class of Italian roads

A main road just after a battle had been fought over it

give way to the other, invariably the motor car gets the advantage. The traffic police fully realize that the loss of a couple of minutes to a motor column may be more important than a delay of half an hour to a string of pack mules and give their orders accordingly. Those orders are never questioned.

Good Italian Drivers

Among Italian car drivers also the preference of fast traffic over slow is never questioned. The Italian army driver is the best in Europe. He is always somewhat of a speed merchant, he considers a car incomplete without an exhaust cut-out, and even on a heavy truck he will assume a sporty attitude; but he is wonderfully clever at the wheel, and although he will take risks with his own vehicle he never intentionally interferes with the safety of other drivers. If the distinctive whistle of a staff car is heard, he immediately gives up as much road as possible; if any hoot is heard in the rear he pulls over first and looks round afterward. It is unknown for a driver to speed up and endeavor to keep ahead of another who has indicated by his hoot that he wishes to pass.

Judged by English and French standards the Italian driver always travels too fast. Yet it is merely testimony to his skill that although conditions are more difficult, accidents are less frequent than on other portions of the Allies' front. This is largely explained by the fact that there are very few war-trained chauffeurs in the Italian forces. One of the conditions of recruiting into the motor car forces is that men shall have had not less than 2 years' practical experience on the road. Gardeners, tailors and laborers who have been through a driving course in 6 weeks are practically unknown on the Italian front. The men are also very much younger than those of the French army, this being due to the fact that Italy did not have to furnish her maximum at the outset, as was the case with her Ally and neighbor.

Few Disabled Cars

An artificial speed limit is not enforced very rigorously. All trucks from 2½ tons up are fitted with engine governors, but 1½-ton trucks, ambulances and staff cars have no such limitation and are capable of being driven at high speed. It is stated that for a period of 20 months the number of permanently disabled cars is only 5 per 1000, which is valuable testimony both to the skill of the drivers and to the mechanical value of the vehicles.

On the whole of the Lower Isonzo front accidents are most frequent by reason of the sudden and very heavy rainstorms. In certain districts it is no uncommon thing for roads to be dusty at noon, completely under water at 6 p. m., and during most of the night and dusty again at 10 o'clock the following morning. To provide for these heavy rains the roads are built with considerable camber and bordered by ditches varying in depth from 2 to 6 ft. Even this latter depth is not always suffi-

cient to carry away all the water brought down by the sudden storms.

No efficient and quickly-applied non-skid appears to have been produced for rubber-tired trucks. In consequence, drivers who suddenly ran from dusty to wet and greasy roads fail to use all desirable caution, and when a skid started it invariably ended in the ditch. These accidents are very much more frequent in summer than in winter, it being on an average of every mile.

Drivers must be given credit for getting out of these positions with very little delay. Unless the car has turned over completely, the bank is dug away to form as easy a gradient as possible, and partly under its own power and partly with the aid of a friendly truck the vehicle is brought back to the road.

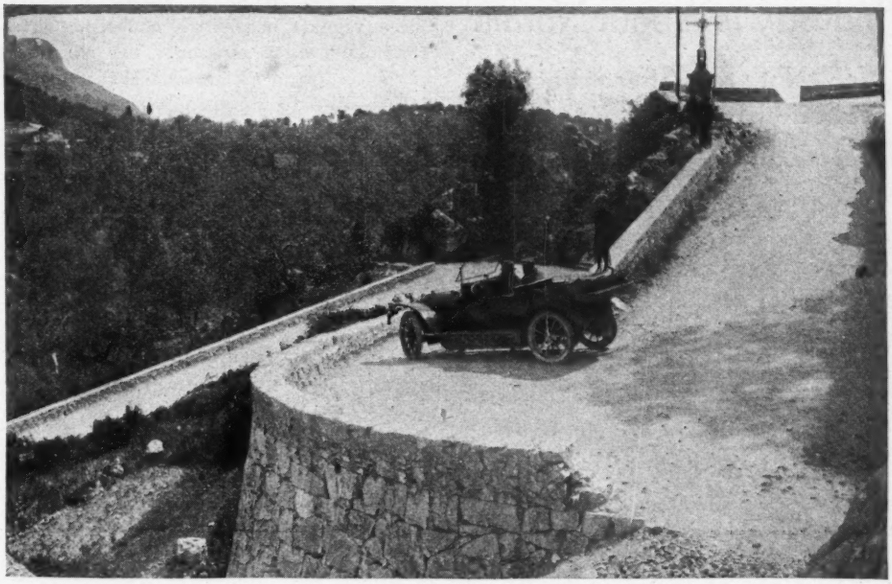
50 Miles—No Lights

Along all that portion of the front known as the Zone of Operations traffic must proceed without lights, nor must any light be shown in the buildings occupied by troops. For a distance of at least 50 miles back of the front there are no road lights, and even in towns of considerable importance the fear of air raids keeps illumination down to such a low point that it is of very little use to the driver. Fortunately, however, lights are allowed on convoys and individual motor cars as soon as they emerge from the Zone of Operations. The regulation light for trucks is an acetylene headlight mounted on the right-hand side of the dashboard, this position giving better protection than in front of the radiator and also allowing the men to attend to the light while driving. Side lamps are never used, and tail lamps are considered an unnecessary encumbrance.

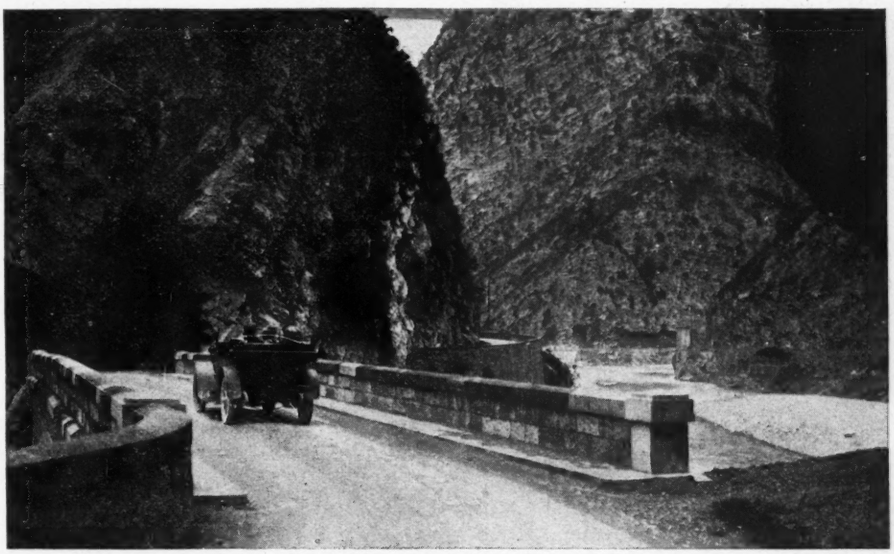
Night Driving Imperative

Carabineri, or military police, have very stringent orders to allow no vehicle to go into the Zone of Operations with any kind of a light. To get the advantage of as much daylight as possible, it is a common practice for supply columns going to the batteries or near the trenches to arrange to reach the edge of the Zone of Operations just as night falls. In consequence, during the first 3 or 4 hrs. of darkness many of the roads literally are packed with all kinds of vehicles moving along in silence and in inky blackness. This work is the most trying a driver can be called on to undertake, for the road surface is always poor, new shell holes are encountered from time to time and he is liable to receive attention from the enemy's guns.

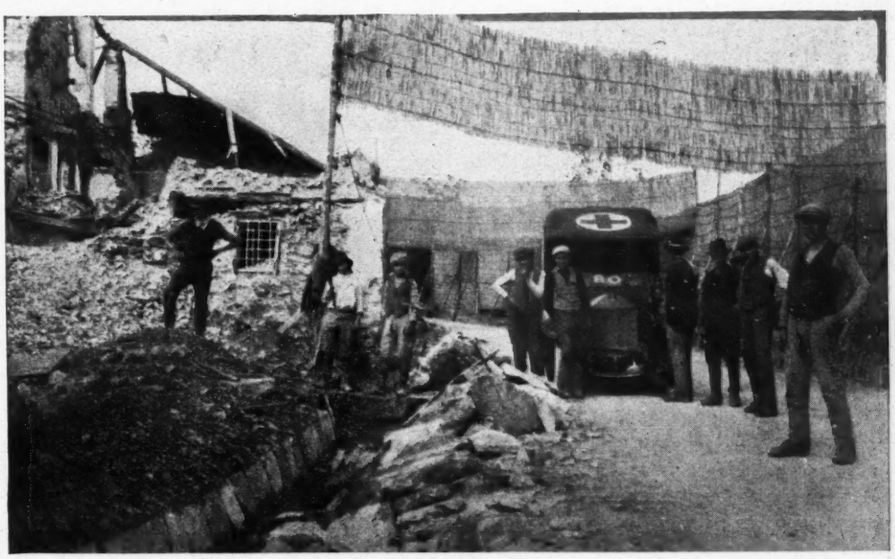
Many a man who is first-class under daylight conditions finds that his eyes or his nerves will not stand the strain of constant night driving close behind the lines. The only relieving feature is that the roads are lit up from time to time by star shells sent up by the home or enemy forces. For a minute or a minute and a half the road is perfectly visible, and the intelligent driver takes advantage of these periods to rush ahead.



A good example of difficult hairpin turns on a mountain road in the Italian alps



This is a fine example of road engineering on the Italian front



A mule track existed here a few months ago. The road has been screened and wrecked buildings pulled down to provide road material

Industry Is About Normal

War Not to Affect Factories Seriously, Is View of Motor Officials

A Few Are Considering Munitions, However

DETROIT, April 9—War and military preparations will not affect the normal status of the motor car industry seriously. This is now the view held by the higher officials of the motor world. The smoke of early rumors and snap conjectures is clearing, and the future, as based on the substantial knowledge of authoritative circles, seems to be less chaotic than first predictions conveyed.

It is pointed out that practically every munitions and other factory which had been engaged in operations for the Allied armies has completed its contracts and is now able to commence work for this government at full capacity. In fact, offers are now coming from Canadian plants who are no longer needed by the Allied armies, and who stand ready to make rifles and other military necessities for the United States. The greatest needs of the Allied nations seem to be food and raw materials, and these, of course, are not connected to an important extent with the motor car industry.

Consequently, it would seem that the majority of the motor car factories will be permitted to continue their normal business, while a few which have already been in communication with the government will manufacture airplane engines and trucks.

Munitions Now On Modest Scale

It is also reported that several of the larger parts makers will devote a part of their factories to the manufacture of munitions and that in a few instances the plants are engaged already in a modest scale in this work. The plan seems to be to take a few of the employes at a time and instruct them in the work and then shift them to the regular employment while others learn the munitions routine. In this way but a few machines are used and the entire force becomes competent and available if future events demand it.

Minor activities continue. The Goodyear Tire & Rubber Co., Akron, Ohio, has added military training to its educational classes, and instruction is given by a former army officer. Workers receive 2 hr. of drill each week.

Lieutenant J. L. Backus of the Thirty-first Michigan regiment is organizing an all-soldier-manned motor truck company and is preparing to drill and train the men with trucks for actual service on short notice. The men will be enlisted as regular soldiers and serve as a part of the quartermaster's corps. As many companies will be organized as possible, and volunteers are sought. Each train will consist of thirty-three regular chauffeurs and nine extra chauffeurs, three assistants, one chief mechanic and three assistant mechanics.

The Higrade Motors Co., Grand Rapids, Mich., is making a four-wheel drive heavy duty truck which will soon be tested by the government ordnance department. The truck is the invention of L. W. Coopock, and if found successful by the government, the Higrade company will take it over with the patent rights and will manufacture it for government purposes.

The Reo Motor Car Co. has formed the Reo Rifle Club which in turn is organizing an infantry company for war purposes.

MANUFACTURING ADEQUATE

Washington, D. C., April 9—Howard E. Coffin, member of the advisory commission of the council of national defense, discussing the work being done by the motor transport committee and the motor trucks standards conference committee to the end of co-ordination of the motor car resources of the country for emergency purposes and quickening of the development of standardization of motor vehicles for such needs, said that with a proper organization of the vast agency of motor transportation a definite service to the nation will result.

Mr. Coffin said that as America now has in active service 2,500,000 motor cars as against 800,000 in use in all the rest of the world put together and that as our present producing capacity is about 1,250,000 cars a year, any emergency call by the military authorities in any district will, due to the months of work of the committees, be met promptly.

DIXIE OVERLAND HIGHWAY

Columbus, Ga., April 9—The Dixie Overland Highway Association has been incorporated to foster the construction of a highway, to be known as the Dixie Overland highway, from Savannah, Ga., to Los Angeles, Cal., to strive for uniform traffic regulations in the eight states through which it will run and otherwise work for a year-'round highway. The highway has been organized three years. The officers are Honorary president, Frank G. Lumpkin, Columbus, Ga.; president, John S. Bleecker, Columbus, Ga.; vice-president-at-large, Harvey Granger, Savannah, Ga.; secretary-treasurer, Leland J. Henderson, Columbus, Ga. The Dixie highway also has Savannah as one terminus.

CINCINNATI GETS MAY 30

New York, April 7 — The Cincinnati speedway has been awarded the May 30 date for a race. Both the Chicago and Cincinnati speedways were after the date given up by Indianapolis when it withdrew from all racing activities in 1917 on account of the war.

Will Mobilize Motors

New Committee to Organize Trucks and Cars for Emergency Needs

Layout of Suitable Highways Will Be Undertaken

NEW YORK, April 10—Special telegram—The mobilization of motor trucks and motor cars for army transportation work has taken definite shape by the appointment of the Motor Transport Reserve Committee by the Council of National Defense, at Washington. Alfred Reeves, general manager of the National Automobile Chamber of Commerce, is chairman of the committee and associated with him are three other men prominent in the industry, Roderick Stephens, president of the Motor Truck Club of America, who is in the coal business in New York; Coker F. Clarkson, general manager of the Society of Automobile Engineers; and A. G. Batchelder, chairman of the executive committee of the American Automobile Association.

This motor transport reserve committee met in Washington, D. C., last week, with Secretary of War Baker and Colonel Baker, who is head of the transportation department of the U. S. Army. As a result of this conference, a rather clear outline of the work of the committee was arranged. A committee is preparing a definite plan for the mobilization of motor trucks and motor cars for emergency needs in any part of the country. It is also preparing a definite plan for organization of available drivers and mechanics needed for such a mobilization. The necessary layout of suitable highways for transportation purposes comes under the work of the committee. It is expected that within ten days good progress will be made and another meeting of the committee held in Washington. The N. A. C. C. took the initiative in this work by volunteering not only to do the work but to share the expense of it as well.

Complete Census Expected

It is expected that a complete census of motor trucks through the country will be made. The committee plans to schedule all available truck fleets of private owners on a basis that perhaps 10 per cent of the trucks should be held available for call on 2 hr. notice; that 20 per cent should be held available for call on one day, or perhaps two days, notice, etc. In this way the committee hopes to know exactly what trucks can be counted upon for emergency needs in any section of the country.

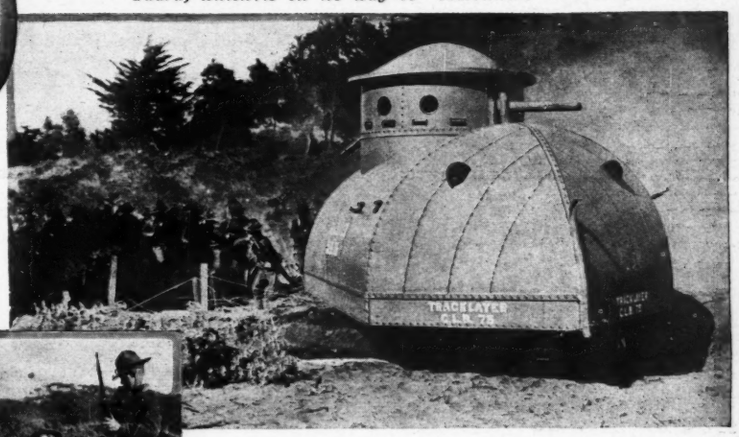
STEWART-WARNER FOUNDRY

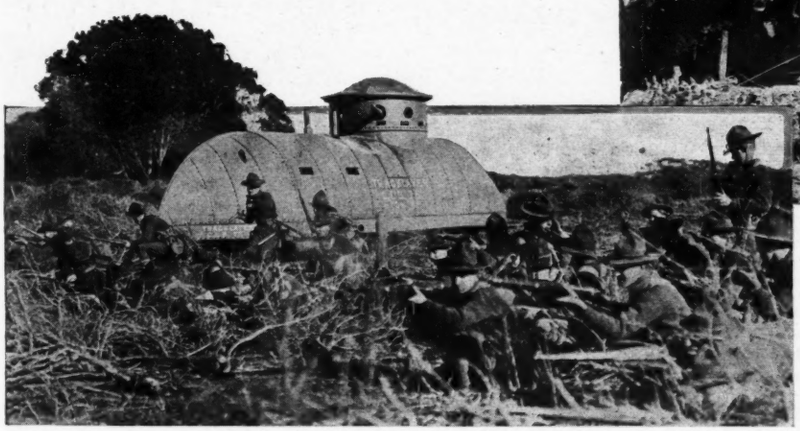
Chicago, April 9—To overcome the delay caused by the dependence of one factory on another in the industry the Stewart-

Motors That Are Spelled W-A-R

A member of the National Aid Society of New York prepares to take the place of a traffic cop if war calls him

Huge motor trucks carry the equipment of this part of the National Guard, which is on its way to "somewhere in Pennsylvania"





Tracklaying tank plowing its way through sand and brush, supported by half regiment of National Guardsmen during maneuvers, when the guns of the tank with supporting infantry drove defendants of the sand hills from trenches. The tank weighs 15 tons, is mounted with six rapid fire guns and can travel at the rate of 6 m.p.h. up an 18 per cent grade. It was made by the C. L. Best Traction Co., who offers its entire resources to the Government. The factory has a capacity of fifty tractors a month

Warner Speedometer Corp. of Chicago has established a foundary at Beloit, Wis., which when in full operation will employ more than 400 persons. The new factory is planned to handle the business of years without crowding and is another step in the concern's plan to control the manufacture of Stewart products from the raw material to the finished article.

The plant at Beloit has two main buildings and five smaller structures. The foundry building, including the cupola room, is 512 ft. long and 122 ft. wide and occupies 62,464 ft. of floor space. The foundry addition cast $100,000. The annealing and pattern shop occupy a building 40 ft. long and 97 ft. wide with a floor space of 43,680 ft. The entire plant, including brass foundry, core room and storage houses, covers more than 150,000 sq. ft. of space.

COST ENGINEERS ORGANIZE

Indianapolis, Ind., April 8—The cost and efficiency engineers in Indiana have formed the Association of Manufacturers' Cost and Efficiency Engineers of Indiana and will meet monthly to discuss plans and methods, to interchange ideas and to receive instruction about new methods in their work. It is planned to extend this organization to all the larger factories of the state and organization work is going forward rapidly.

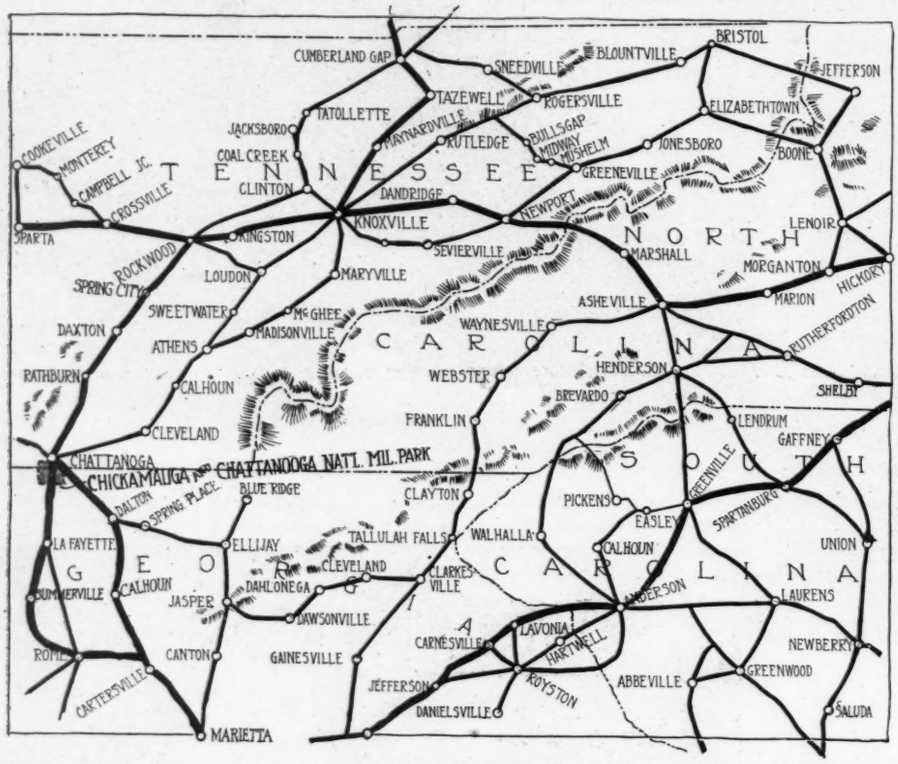
The officers are: Guy E. Sharpe of the Link Belt Co., Indianapolis, president; C. O. Peek, Nordyke & Marmon Co., Indianapolis, vice-president; F. T. Cullens, Nordyke & Marmon Co., secretary, and H. J. Wilson, Warner Gear Co., Muncie, treasurer. These four men and D. E. Nauman, Remy Electric Co., Anderson; M. P. Witherspoon, National Motor & Vehicle Co., Indianapolis, and Charles R. Ogsbury, Tabulating Machine Co., Indianapolis, form the board of directors.

DEDICATE SHERIDAN ROAD WORK

Chicago, April 9—Parts of Sheridan road to the north of Chicago, which have been under construction, are now complete and will be dedicated next Saturday. A call has been made to Chicago motorists to enter their cars in a parade which will leave the Art Institute at 1:30 p.m.

In the Shadow of Old Lookout

Famous Peak Commands View of Seven States



Map roads in district contiguous to Lookout Mountain that stands sentinel over Chattanooga, Tennessee

DOWN at the southern end of the eastern mountain range is found Chickamauga and Chattanooga National Park, embracing over 15 sq. mi. These battlefields are marked with monuments commemorating the struggles fought there between the North and South. Scarcely a sentence is needed to justify the selection of what may rightly be termed the historical section of the United States as an objective for those tourists who enjoy digging into the musty archives of early life in our country. The trail of romance and legend, of peace and warfare, leads one down the Shenandoah valley and along the backbone of the Atlantic states formed by the Allegheny and Blue Ridge mountains, affording an opportunity to study epochal periods of American history from all their pristine sources.

Indian Paths Now Roads

The paths across the Blue Ridge and Allegheny mountains were first made by the Indians, but the white man's government has since made roads which traverse a good part of this historical section.

Lookout mountain, Tennessee's great historic resort, offers the tourist unsurpassed opportunities for the enjoyment of some of the finest scenery America can produce. Rising 2300 ft. above sea level and 1700 ft. above the city of Chattanooga at its base, the view from its lofty summit is one of exceptional grandeur and extent, embracing a view of seven states—Tennessee, Kentucky, Virginia, North Carolina, South Carolina, Georgia and Alabama. The faint blue outline of the Cumberland mountains lie to the northwest; between them and Lookout stretch the lower peaks of the Sand and Raccoon mountains. Walden's Ridge, Cameron Hill and Sherman Heights continue the line to the east where Missionary Ridge, backed by the Great Smokies, unite to form the eastern circumference of the vast semi-circle revealed from this spot. In the foreground wind the silvery waters of the Tennessee river, the picturesque convolutions of which describe a remrakable curve, known as Moccasin Bend.

Missionary Ridge, and Sherman Heights, Cameron Hill and Lookout itself stand as perpetual monuments to those who fell near by, and Chickamauga in the valley beyond arouses the memory of stirring scenes enacted over a half century ago. Lookout mountain extends over the border line into Georgia, and along its rugged sides are observation points, from which one gets remarkable views. Among the principal attractions are Sunset Rock, Rock City, the Natural Bridge, Telephone Rock, Lulah Lake and Falls, the Leonora Spring, and each visit to these and the many other natural curiosities on the summit is a fresh revelation to the tourist, who would find it impossible to exhaust the resources of the mountain in an entire season.

Besides being the great theater of the Civil War, this section has many other claims to distinction. A library might be written about this part of our country, which extends along the Appalachian range —stories in which interest would never lag. Take for example, a little stretch of country between Staunton and Richmond, Va. It is said that the country around Charlottesville, within a radius of 20 miles has produced more presidents, statesmen, jurists, foreign diplomats and others of note than any similar section of the United States.

Birthplace of President Wilson

Staunton can boast of being the birthplace of President Wilson, who was born in 1856 at the "Manse" on the southwest corner of Frederick and Coulter streets. Proceeding down toward Richmond, one comes to Rick Fish Gap, which is the famous point where the early settlers saw and laid claim to the Shenandoah Valley in the name of the king of England. This gap was much used by Federal and Confederate soldiers.

Charlottesville, situated on the road to Richmond, was the capital of the state in 1782. Among the foothills of the Blue Ridge lies the University of Virginia, founded in 1819 by Thomas Jefferson, who devoted himself to its welfare. It was the child of his old age when he lived at Monticello. President Monroe also lived at Charlottesville, his residence being Monroe Hill and his farm, Ash Lawn. Benjamin Franklin once owned an estate there and the birthplaces of Lewis and Clarke, the great explorers, are nearby.

North Carolina mountain sections are as replete with interesting historical associations as are the Virginias. Leaving Winston-Salem and going 30 miles south brings the tourist to Guilford Battle Grounds in Greensboro. Fifty miles farther is Salisbury, the site of a Confederate prison in which 1200 soldiers died while in captivity, being buried in the National Cemetery close by. The city was once noted as a gold mining town, the old gold mine having produced $20,000,000 in bullion.

We announced last week that during the touring season we would continue to publish information of the same chacter as appeared in the Touring Issue, that is, give supplementary tours for week-end or holidays. In keeping with this announcement, we give herewith additional tours as shown on the map on this page, tours that may be linked for a longer tour if desired. Next week we shall take up another sec-

tion of our country and give additional information on short tours originating from the principal cities in that section that could not be given in their entirety in the April 5 issue.

Chattanooga, Tenn.

1—To Knoxville and return, 250 miles. It is optional with the tourist which way he goes on this trip, since there are two or three routes. One is to follow the Dixie highway north and east through Rathburn, Dayton, Spring City and Rockwood, then east through Kingston to Knoxville. Two roads lead south from Knoxville as far as Athens, one via Maryville, McGhee and Madisonville and the other via Loudon and Sweetwater. These two roads converge at Athens and the route into Chattanooga is by way of Calhoun and Cleveland.

2—A somewhat shorter tour than that outlined in No. 1, and which may be made in one day, is a circle drive south over the Dixie highway by way of Lafayette and Summerville to Rome, Ga., thence east to Cartersville and return over the eastern Dixie highway through Calhoun and Dalton. If one wishes to extend this trip into two days, instead of turning back at Carterville, continue south through Marietta and thence to Atlanta. Returning, retrace your way to Marietta from Atlanta and then drive north through Canton, Jasper and Ellijay and then west through Spring Place to Dalton and Chattanooga.

3—Chattanooga has much to interest the motorist in the territory immediately surrounding the city. Here one finds historic spots and scenery that will keep interest aroused for days and no one should overlook the important things to be seen close at hand in order to take long tours out of the city.

Knoxville, Tenn.

Knoxville, situated in eastern Tennessee, is the hub of a very complete system of pikes and offers a number of interesting short trips of scenic and historic moment. The city is the junction point for the Dixie and Southern National highways.

1—A circle tour of 300 miles, which may be cut in half if the tourist desires, takes one northeast through Rutledge, Rogerville and Blountsville to Britol, thence south to Elizabethtown and returning southwest through Jonesboro, Greenville and Newport, where there is an option of driving into Knoxville via the Southern National highway through Dandridge or keeping to the south and driving through Sevierville to Knoxville. This 300-mile trip may be cut in half by cutting across from a point a little beyond Rutledge and going through Bullsgap, Midway and Mushelm to Greenville where the return route mentioned joins with the cut off.

2—A good one-day trip of 125 miles out of Knoxville takes one via Clinton to Rockwood and return by way of Kingston. There is a possibility offered of cutting across to Kingston a short distance east of Rockwood, which shortens the trip to about 100 miles.

3—A circle tour of 150 miles takes one north through Maynardsville and Tazewell to Cumberland Gap, following the Dixie highway, and return by LaFollette, Jacksboro, Coal Creek and Clinton. From LaFollette a side trip may be made to Jellicoe, 20 miles.

Asheville, N. C.

Asheville, the metropolis of western North Carolina, is one of the most famous mountain resorts in America. The city, often called the "Queen of the Mountain Tops," is the social and commercial center of "the Land of the Sky." Here the Swannanoa and historic French Broad rivers join in the very center of a vast plateau 250 miles long and 50 miles wide. Within two miles of Asheville is Biltmore, property of the late George W. Vanderbilt. This is a densely forested tract containing nearly every kind of tree to be found in the mountainous region of eastern United States. Through the vast grounds of this estate are motor roads of the finest type. Last year the country around Asheville was visited by one of the most disastrous floods ever known in that section and practically all of the roads were more or less damaged. Rapid strides in repair work have been made, but it is best to make inquiry before attempting side trips out of Asheville.

1—To Mount Mitchell—This is an 18-mile trip and at the summit of Mount Mitchell one reaches an altitude of 6711 ft., the highest point in eastern North America. Two days should be allowed for this trip. There is no motor road to the summit, but it can be made on foot or muleback. Guides and mules can be obtained at reasonable rates.

2—To Pisgah Mountain—Twenty-six miles from Asheville is Pisgah mountain, which rises 5749 ft. above sea level. There is also an exclusive motor road to Sunset mountain to the northwest of Asheville. From either of these two mountains a wonderful panorama is unfolded to the visitor.

3—To Knoxville, Tenn.—This is a drive of 130 miles through Marshall, N. C., Newport and Dandridge, Tenn. Marshall is a unique city in that it is one mile long, one street wide and sky high. It is on the banks of the French Broad river and hemmed in by mountains on either side. This trip takes one across the Great Smoky mountains into Tennessee which offer superb scenery.

4—A 150-mile triangle trip takes one to Spartansburg, S. C., via Hendersonville and Lendrum, then to Greenville, S. C., and return to Hendersonville. Greenville is a college town and also a manufacturing center. One of the first National highways was projected by Hon. Joel R. Poinsett, secretary of war under Fillmore. This road, passing across the mountains in the vicinity of Greenville at Saluda gap is still used and its massive stone bridges attest Poinsett's skill as an engineer. There are a number of interesting side trips at Greenville, among them being Caesar's Head, about 20 miles distant, which has scenic features of more than usual attractiveness.

5—To Atlanta—This road goes to the West of the mountains through Waynesville, Webster, Franklin, Clayton, Ga., and Talulah Falls to Clarksville, where there is an option of going west to Jasper, via Cleveland, Dahlonega and Dawsonville, and thence south from Jasper through Clayton and Marietta to Atlanta, or by keeping straight south from Clarksville though Gainesville and striking the Southern National highway a short distance to the east of Marietta and then into Atlanta.

6—This is a beautiful mountain trip from Asheville to Anderson, S. C., passing through Brevardo and Walhalla. This road is rough in places but offers some very interesting scenery.

Anderson, S. C.

Anderson, S. C., is on the Southern National highway and there are a number of short week-end tours that may be made with this city as the starting point.

1—This takes one directly east through Laurens to Newberry, thence north through Union to Spartanburg, where the Southern National highway is touched, thence west to Greenville and south to Anderson.

2—This takes in a part of tour No. 1, that is, that part as far east as Newberry, thence south to Saluda and return through Greenwood to Anderson. There are several cut-offs on this tour, any one of which may be taken to lengthen or shorten the total distance.

3—West from Anderson one can follow the Southern National highway to Atlanta, Ga., making side trips to Royston from Lavonia, Carnesville or Jefferson.

Routes and Touring Information

Selma, Ohio—Yellowstone Park—California—Grand Canyon

SELMA, Ohio—Editor MOTOR AGE—Kindly give route through Columbus Junction, Iowa, Yellowstone Park, Caldwell, Idaho, and Silver City, Idaho, Portland, Ore., south through California to San Diego and the Grand Canyon.—F. M. Wilson.

From Selma, Ohio, proceed to South Charleston, Springfield, Urbana, Bellfontaine, Kenton, Dunkirk, Findlay, Lima, Delphos, Van Wert, O., New Haven, Ind., Fort Wayne, Churubusco, Noblesville, Ligonier, South Bend, New Carlisle, Michigan City, East Gary, Miller, Aetna Station, Gary, Calumet, East Chicago, Hammond, Ind., South Chicago, Ill., Chicago, Lombard, North Glen Ellyn, West Chicago, Geneva, DeKalb, Creston, Rochelle, Ashton, Dixon, Sterling, Unionville, Morrison, Unionville, Garden Plain, Albany, Cordova, Port Byron, Watertown, E. Moline, Moline, Davenport, Ia., Blue Grass, Muscatine, Fredonia, Columbus Junction, Columbus City, Washington, Harper, Springfield, Oskaloosa, Pella, Prairie City, Des Moines, Adel, Redfield, Dale City, Monteith, Guthrie Center, Exira, Walnut, Avoca, Minden, Underwood, Weston, Council Bluffs, Omaha, Neb., Elkhorn, Waterloo, Valley, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Central City, Grand Island, Wood River, Shelton, Gibbon, Kearney, Odessa, Elm Creek, Lexington, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodgepole, Sunol, Sidney, Potter, Dix, Kimball, Bushnell, Pinebluff, Wyo., Egbert, Burns, Cheyenne, Chugwater, Wheatland, Uva, Glendo, McKinley, Orin Junction, Douglas, Glenrock, Casper, Johnson's Ranch, Powder River, Hell's Half Acre, Waltman, Arminto, Los Cabin, Reid's Ranch, Thermopolis, Worland, Manderson, Basin, Cody, thence into Yellowstone Park and out at Yellowstone Station. Proceed to Flat Rock Bridge, Osborn Bridge, Ashton, St. Anthony, Sugar City, Rexburg, Rigby, Idaho Falls, Arco, Martin P. O., Carey, Gannett, Bellevue, Hailey, Soldier, Old Corral, Dixie, Mountain Home, Boise, Caldwell, thence directly south to Silver City. Back to Caldwell, New Plymouth, Fruitland, Payette, Weiser, Huutington, Ore., Baker City, Haines, North Powder, LaGrande, Meacham, Emigrant Springs, Pendleton, Heppner, The Dalles, Portland; thence south over the Pacific Highway through Salem, Eugene, Roseburg, Medford, Ashland, Yreka, Cal., Dunsmuir, Redding, Anderson, Red Bluff, Marysville, Wheatland, Roseville, Sacramento, taking the Pike's Peak Highway into San Francisco. Proceed to Santa Clara, San Jose, Gilroy, San Juan, Salinas, Soledad, King City, San Lucas, Bradley, San Miguel, Paso Robles, San Luis Obispo, Santa Maria, Los Olivas, Ventura, Los Angeles, Santa Ana, Oceanside, San Diego, La Mesa, Camp, El Centro, Holtville, Knobb Siding, Yuma, Ariz., Dome, Antelope Hill, Norton's Ranch, Palomas, Aqua Caliente, Arlington, Palo Verde, Phoenix, Hot Springs Junction, Tub Springs, Wickenburg, Congress Junction, Date Creek, Hillside, Kirkland, Skull Valley, Prescott, Jerome Junction, Del Rio Station, Ash Fork, Williams.

Uniform Traffic Rules an Asset

Yellowstone Trail Will Profit from Standardization

OF twenty-five large cities, chosen at random, fourteen make one blast of the traffic officer's whistle indicate north and south traffic proceed and eleven make the same signal apply when east and west traffic is to proceed. In these same twenty-five cities the allowable speed in the business district varies from 8 to 16 miles an hour; five set the limit at 8, eleven at 10, three at 12, five at 15 and one at 16 miles an hour. In the residence districts of these twenty-five cities the speed limit range is from 12 to 25 miles an hour; three set it at 12, eleven at 15, three at 18, seven at 20 and one at 25. Headlight regulations in these same cities vary as much as speed and signals. Five have no regulation of lights at all, five require "reasonable" lights, one sets the extreme mark at which the concentrated beam of light shall strike the ground in front of the car at 75 ft., one at 150 ft., ten at 200 ft., and three at 300 ft.

Two of these phases of traffic regulation and possibly all three are fundamental principles that can and should be uniform. The average motorist today is quite as much perplexed with the variance of traffic regulations as he would be were he able to speak but one language and had to travel through fifteen or twenty towns a day in each of which a language different from his own was spoken. Surely the cross-country motorist needs an interpreter as his constant companion when touring if he hopes to obey the rules for governing his movements through municipalities, and even then he could not hope to be right more than half of the time.

Organized effort being superior to individual, the various cross-country highway associations might well make it a part of their work to bring about a revamping of different traffic regulations and putting every city on each through highway on a uniform basis. This is a question that should not be plunged into blindly; the highway associations should work together. A committee made up of two or three members of each highway association should be gotten together and a sane set of rules, which, basically will apply to every city, town and village, adopted. Then there would be no likelihood of conflicting rules as between the different highways, once the work was under way.

Just now MOTOR AGE is concentrating its efforts toward bringing about standardization of traffic rules in every village, town and city on the Yellowstone trail west of Chicago. Here are approximately 250 cities linked together by approximately 2500 miles of highway, over which many touring parties pass every day in the touring season. It can be said without exaggeration that traffic regulation differences are almost as numerous as the cities themselves, therefore, the problem a motorist faces when he attempts to pass through ten or twenty towns a day is not conducive to his peace of mind.

It would be just as much of an asset, yes even a greater asset when viewed from some aspects, for every named highway to have uniform traffic rules in force the entire length, and by this we mean uniformity that not only applies to the cities on that named road, but every other named road, as it would to have its entire surface paved.

Motorists and members of the Yellowstone Trail Association are thoroughly aroused to the necessity for standardizing the traffic laws along the entire trail length. We have told them what such a move would mean as an asset to the road as a whole, how it would attract tourists, how it would reduce accidents and make for greater peace of mind on the part of the motorist using the road. We have told them what fundamentals are applicable to every town, no matter what its population. We have told them how to go about stirring up interest and approaching officials who have the making of traffic rules in hand.

The response has been very gratifying. The need for uniform regulation has carried home and within the next few months we may expect the Yellowstone Trail to add to its present slogan: "A good road from Plymouth Rock to Puget Sound," that of "Uniform traffic regulations its entire length."

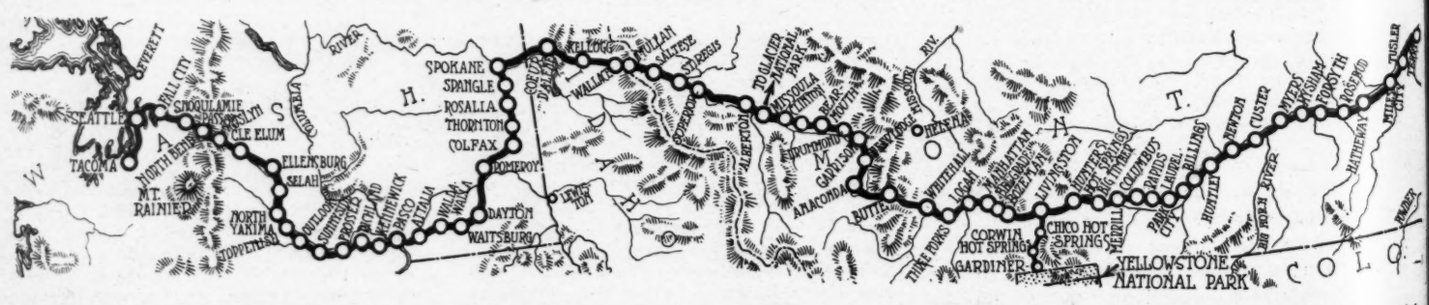
Traffic Signal Controversy Reopens

DENVER, Colo., March 21—Editor MOTOR AGE—The remarks and criticism of Max Cerf in MOTOR AGE of March 15 were read with interest and I must take exception to portions of his article, for from what he says, I am led to believe that he cannot be conversant with traffic ordinances in general, nor with the operation of motor cars from the driver's standpoint.

Mr. Cerf would put another signal on the front of a car for the pedestrians' benefit, for it certainly would not be of any service to other motorists. Anything in the way of a signal sufficiently large to attract the instant attention of a pedestrian will be a wind catcher, and will disfigure the symmetry of the car. The streamline body was developed to cut down wind pressure, as well as to give a racy appearance. The lamps have been made smaller, some of them put inside, the horns are now mostly inside, and the marked tendency is to clean up the lines at the front of the car. A splint or wind puff on the leg of a driving horse was a blemish that could not be tolerated, because it was a wart on the smooth line or curve. Neither will a signal be tolerated that stands out on a front fender or hood like an excrescence.

Let us not lose sight of the fact that the Safety First Federation of America definitely located all traffic signals on the left rear fender, in order to have them visible from the rear and unobstructed by tires usually carried on the back of the car, also to have a uniform location adopted throughout the country. Then why hunt about for any other location?

It is all well enough to theorize on what the motorist should do, but when it comes to forcing him to install signals on the front as well as on the back of his car, he



This map shows the close proximity of towns on the Yellowstone trail west of Chicago but does not show much more than one-half of the towns, cities Traffic rules have been a bugbear to Yellowstone trail tourists the same as to those traveling over other highways, and it is believed, judging from the month will see practically every municipality through which this 2500 miles of highway passes

will surely balk, and with good reason. Bear in mind that two signals on each car will run up to between $40,000,000 and $50,000,000 before all cars are equipped, so before any drastic action is taken, requiring signals on all cars, let us get signals standardized, the cost down to a minimum, and the unnecessary eliminated.

We do not want to see an ordinance passed anywhere that will compel anyone to buy a traffic signal. When the motorist is convinced that a signal adds to his peace of mind and to the ease and comfort of driving, he will install the signal which to his mind best suits his conditions, and he will not need any forcing, furthermore he will not stand any.

I believe it was the sense of the last meeting of the Safety First Federation, that there had already been enough and too much legislation applying directly to the motorist and that further legislation should affect the pedestrian only. Many cities have made it unlawful to cross streets except at regular crossings, and then only in right angles, no corner cutting or jay walking allowed. The pedestrian has always had the right of way at crossings, but has allowed the motorist to encroach upon his rights, so that now it is considered necessary to mention in new ordinances that the pedestrian still has his rights.

Time Lost by Signal

In crossing a street on foot, one looks at the bulk of a car bearing down on him, and if a tiny signal has to be looked for, a valuable second is lost. Cities require a certain speed at crossings, and if a car is moving sufficiently slow to give a pedestrian time to observe a signal, it will be moving slow enough so that a slight hand movement or nod will be all that he needs or has time to notice.

The traffic officer and pedestrian may as well be eliminated from this discussion, because the traffic officer has control of the situation anyway, and does not have to be warned—the pedestrian has the right of way at crossings in practically all cities, and besides he cannot take time in dense traffic to ascertain in advance what each motorist has in mind. By the time he has settled it in his mind what one car is going to do, another car is presented for his inspection and he will be left standing at the curb till the roadway is clear.

The pedestrian who needs other warning than the sight of cramped wheels or obliqueness of car, to warn him that a car is turning, does not belong in the city, or should move to so large a city that he will find an officer at every crossing. If the ordinance for left turning, requiring motorist to pass around center of street intersection, is obeyed, the turn is not started until after the crossing is passed, and when a right turn is made, the same applies for the first crossing, and the people on the intersecting street crossing can readily see the whole bulk of a car making the turn, and need no further warning. In other instances, when there is a doubt which way a car is to turn, a slight hand movement is all that is needed.

As far as the traffic officer is concerned, he will not pay any attention to a traffic signal, for the very simple reason that he does not need to.

Purpose of Arm Signal

The arm or hand signal was never intended for the man ahead as Mr. Cerf seems to imply, but is for the sole purpose of notifying the following car or the traffic officer, and the traffic signal is intended to do away with the arm movement, in so far as the following car is concerned. When the car is inclosed, an arm signal cannot be seen from the rear but can be seen by a traffic officer.

The horn was originally intended for the warning of the pedestrian, just as the bell used to be on the bicycle, but both have passed, in fact, some cities and rightly too, have ruled against the use of horns except in the most modest way. The bell and horn are the direct cause of many accidents, on account of startling and confusing people, who otherwise would have walked on out of danger. They stop, often turn around, step back or directly in the path of the car. Follow up most any street accident and you will find that the motorist is rarely to blame.

One would think from a reading of Mr. Cerf's article that a motorist never walked, whereas in fact, he walks the downtown streets quite as much as the average pedestrian who does not own a car, and is just as anxious to have sane and careful driving as anyone, for he realizes that his family or parents may not be as agile or careful as himself. We will admit that there are a few drivers that should be ruled off the streets, and will be sooner or later, but the average motorist is extremely careful of the rights of others, and has it in for the "road hog" just as much as anyone.—Edwin H. Roberts.

FURNISHES $825,625 BOND

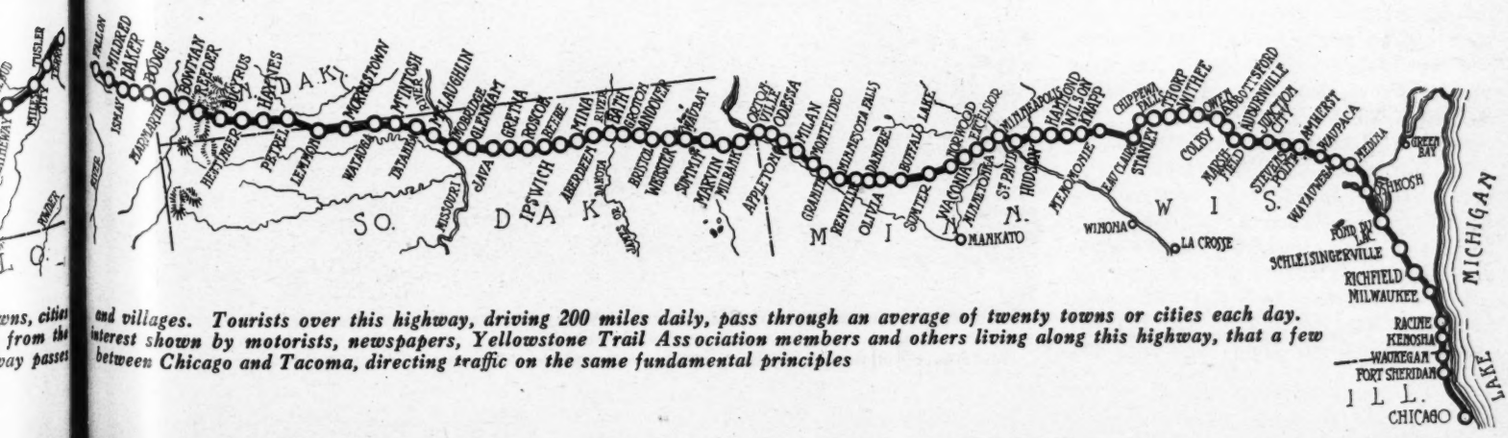
Cleveland, Ohio, April 9—The Peerless Motor Car Co. has filed a bond in the court of common pleas for $825,625 to stay the execution of a verdict of $412,812 recently awarded Henry S. Chapman in his suit for war truck commissions. The Peerless company has recently filed a request for the hearing.

MORE TIRE ADVANCES

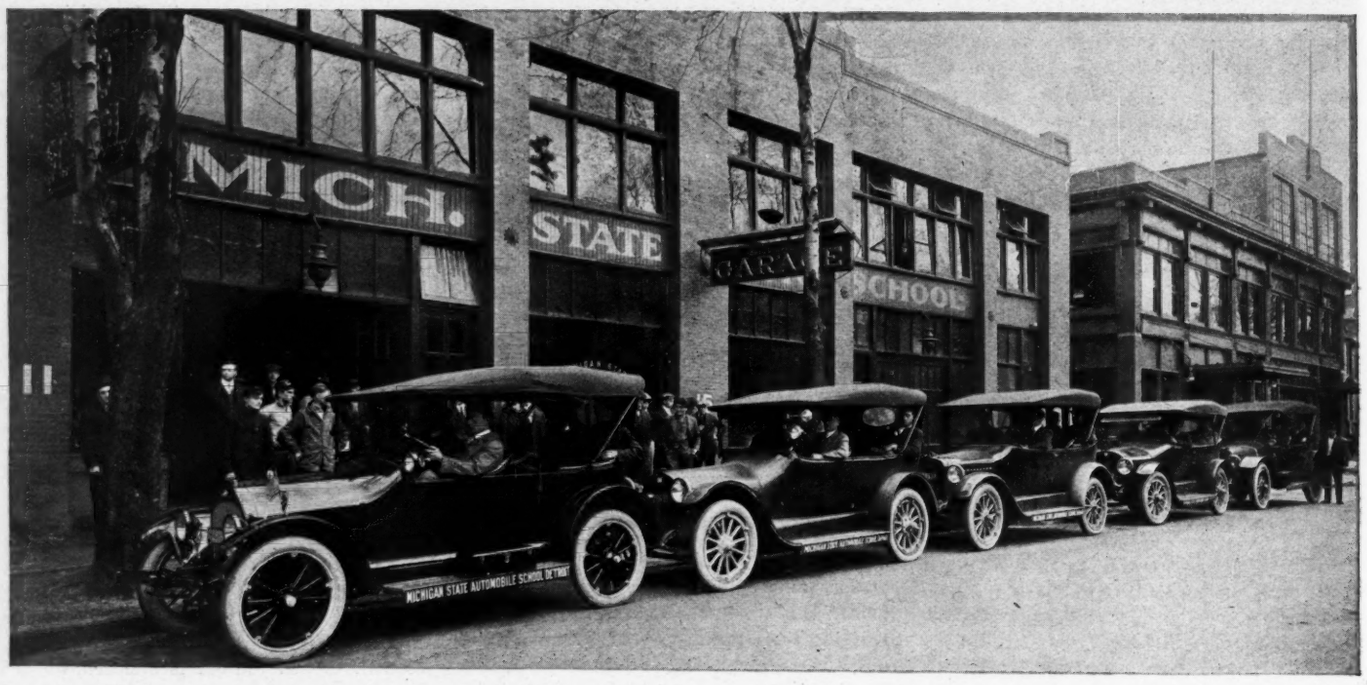
New York, April 6—Further price increases among the tire companies are reported this week, the remaining companies revising their listings about 10 per cent as did those companies the previous week. Empire is 10 per cent higher through its whole list; Globe is 5 to 10 per cent higher; Leo is higher; and Miller has gone up 10 to 12 per cent. Pennsylvania Rubber expects to announce an increase soon.

DODGE-FORD SUIT POSTPONED

Detroit, April 9—Hearing of the Dodge-Ford suit, previously set for Monday, April 9, will not be held until "as soon as possible after May 1." The postponement is the result of an informal agreement by attorneys on both sides. This suit was brought originally Nov. 1, 1916, by John F. and Horace E. Dodge, when they complained that Henry Ford had no right to withhold from the stockholders of the Ford Motor Co. some $50,000,000 in dividends for the purpose of reinvesting the money in duplicating the plant at Highland Park and building a smelter on River Rouge to make iron by a new process. As the case now stands, Henry Ford is free to carry out his plans of expanding the Ford company, his right to build a smelter plant having been obtained by his furnishing a $10,000,000 bond Jan. 6 to indemnify the Dodge brothers in case the court should finally grant their petition for an injunction to prevent his operations.



and villages. Tourists over this highway, driving 200 miles daily, pass through an average of twenty towns or cities each day. Interest shown by motorists, newspapers, Yellowstone Trail Association members and others living along this highway, that a few between Chicago and Tacoma, directing traffic on the same fundamental principles



The Michigan State Auto School garage and some of its students driving cars in front of it

A School That Uses Motors as Textbooks

By J. E. Schipper

OUT of the rather chaotic conditions which have surrounded motor car schools in this country during the last few years there seems to be a clearly defined movement of a very legitimate nature. This is the instruction of men who reside in the rural districts throughout the country who intend setting up motor car repairshops. Many young men whose fathers are farmers are coming to larger centers to obtain instruction in the repair of motor cars so they will be able to start repair shops and service stations in their own localities.

The importance of this movement has been realized by the manufacturers, with the result that active co-operation is being extended by them to the schools.

The Michigan State Auto School in Detroit, which has nearly 1000 students, is a good example of the modern type of motor car school. Of these students 80 per cent are from outside towns, cities and rural districts. The school course averages from ten to twelve weeks, though some students have gone through in less time. The classes are held both day and night, and the student may take either or both classes, as he desires, without extra charge.

The tuition rates are $100 for cash and $120 on time payments. The time payments may be made for the day course, $40 down and $10 a week, or for the night course, $30 down and $5 a week. A guarantee is given that the school will refund the tuition fees if they do not give the graduate a position paying him from $75 to $300 a month, and a free employment department is mintained with the school.

The course covers the entire chassis, with actual experience in assembling, block testing, bearing scraping, valve grinding, road testing, adjustments and general garage and repairshop experience on actual cars. With the school is a garage and repairshop where all makes of cars are taken in to give the students the benefit of the experience. On an average twenty cars of different makes are in the garage for students to work on, and the number sometimes reaches thirty-five.

There are two lecture rooms, each seating more than 400 students. One of these is used as a mechanical room and the other, electrical. The electrical course is as complete as the mechanical and is in charge of men who are members of the Society of Automobile Engineers and who have had actual experience in this work. In the electric department for advanced work the electrical systems of cars are mounted on

Welding department, showing twelve welding machines and one cutter in operation

steel frames where they can all be seen, and the student, after becoming thoroughly familiar with these, is shown the actual apparatus on cars. On the frames at the present time are four Delco systems, one being the twelve-cylinder Packard outfit and others including Ward-Leonard, Gray & Davis, Simms, Huff, Wagner, Bijur, Remy, Auto-Lite, Westinghouse, Northeastern, Atwater-Kent, Connecticut, etc.

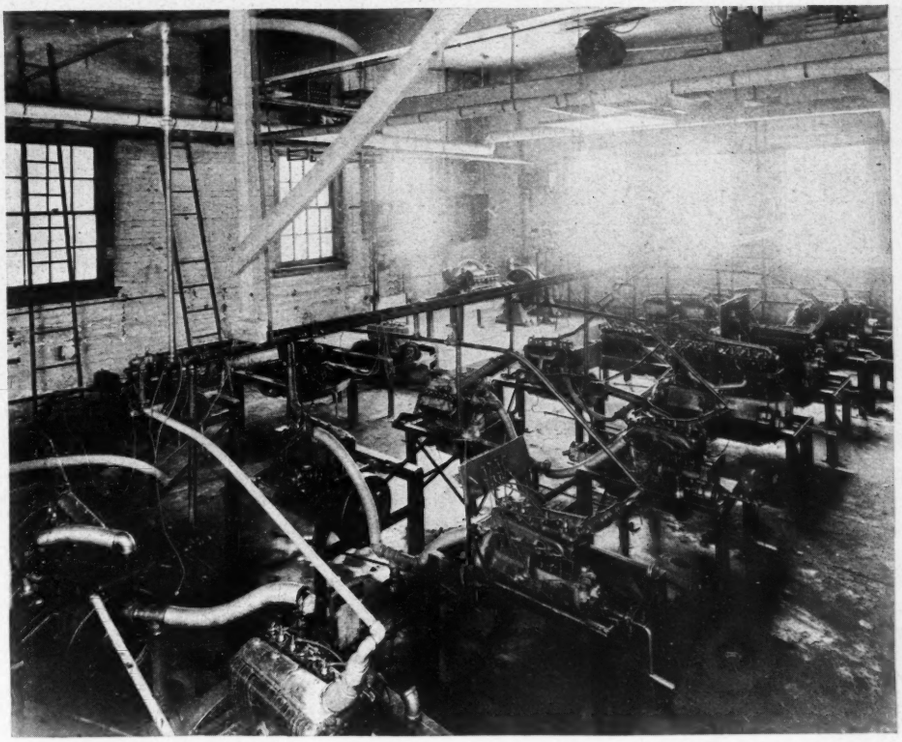
In the block test department are twenty engines, including two-, four-, six-, eight- and twelve-cylinder designs. There is also a Sprague electric dynamometer for testing, and men are trained particularly in dynamometer work if so desired. There is a twelve-cylinder Weidely engine at present on the dynamometer.

All Types of Rear Axles

In the rear axle and transmission department all types of rear axles are available for the benefit of the students. These are full-floating, semi-floating, worm drive, etc. There are also different types of transmissions, clutches, steering gears and universal joints.

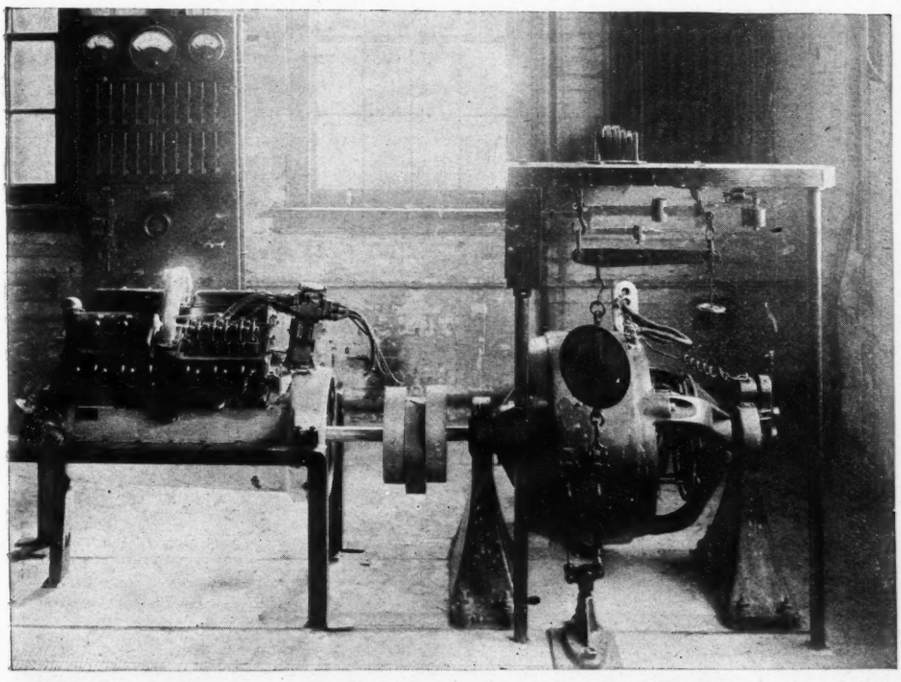
The repair department has crankshafts, connecting rods and bearings for scraping, and it is in this department that owners' cars are taken so that miscellaneous jobs can be handled.

A recent addition to this school is a chassis department into which the students are taken after they have gone through the other departments. They are allowed to specialize on any chassis they desire in this department, so that if they are going to take an agency of a car they can specialize on that particular car in the school. The chassis in this department are new and are furnished by the manufacturers. At present there is a Chalmers 6-30, Willys-Knight, Detroiter six, Oldsmobile eight, Detroit electric, Hudson Super-Six, Cole eight, Maxwell four, Studebaker six, Saxon six, King eight, Paige six, Ross eight, Winton six and a Packard Twin-Six. Besides others, including truck models, are to be added.



Block test department for use in setting carbureters, valves, timing and so on

The final step is a road or drive test which is required before a student can get a diploma. The driving cars are equipped with two clutch pedals, so that the instructor can throw the clutch out should the student lose control. With this equipment a complete course is given. The students actually work on every part of the car, the new students first being put through a department where they learn the names of the different parts, their location and their purpose. They then are put in the assembly department, where they assemble engines, axles, transmissions, chassis, etc. Next they enter the block test department, where they get actual experience in adjusting different makes of carbureters, magnetos and tappets, timing engines, scraping bearings, grinding valves, etc. The same process is then gone through in the electrical department, and the examinations are given at each step. These examinations must be passed in each department with a standing of more than 75 per cent in all departments before a diploma is given. The student can remain as long as he likes after graduation without extra charge to get all the practice that is felt necessary to make the graduate competent.

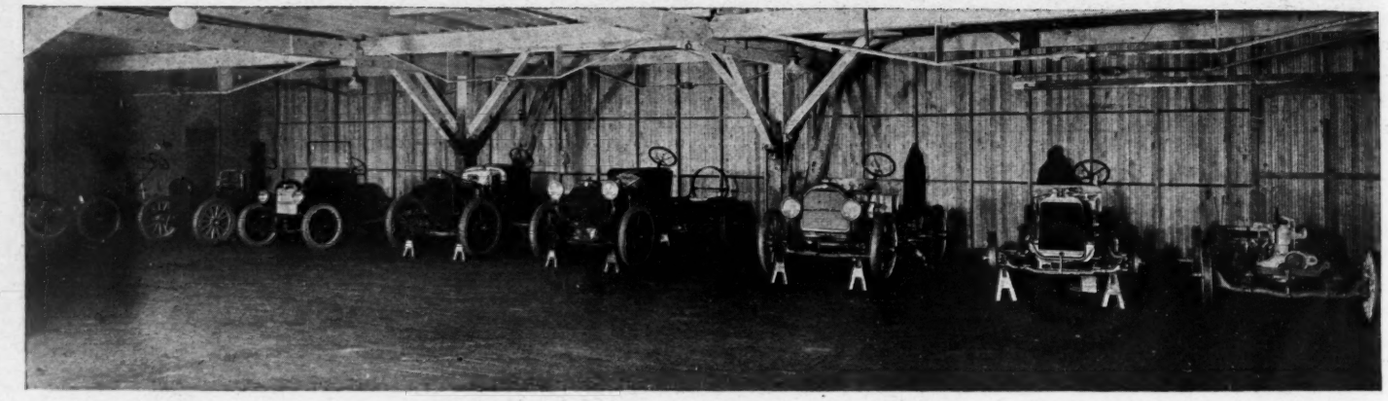


Sprague electric dynamotor and Weidely Twin Six—These are in the far corner of the block test room

Two Departments

The course of work is divided into two departments—the mechanical and electrical. Before the student is started into practical work he first completes a lecture course of two or three weeks, after which he must pass an examination. When he has a passing mark of 75 per cent he goes to his practical work. This lecture course is essentially theoretic in nature, giving the fundamental principles of mechanics and electricity involved in the two main departments.

The school has two large lecture rooms, both of which will seat more than 400 students. The mechanical lecture room is equipped with a Chalmers cut-out chassis,



The chassis department contains brand new chassis that have been lent by motor car manufacturers for demonstrating purposes

Saxon six cut-out chassis, a Hupp cut-out gine, thirty-five carbureters, transmis- m systems, differentials, steering appara- etc. By this equipment the lecturer s up the elementary principles in- ed in the engine, explaining the cycles, the operation of the valves and various other units and, passing through the transmission system, taking up the fundamentals of each part.

All Necessary Equipment

The same system is carried out in the electrical course. In the electrical lecture room the course starts with the simplest electrical action. All the necessary equipment for demonstrating the simple operations of electricity are included in the equipment. There is a static machine, leyden jars, condenser, electrophorous, pitch balls, simple generator device, dynamo-motor and rotator, primary and secondary coil, magnets, galvanometer, magnet board, resistances, magnetic needles, discharger, etc. The student is given a simple and comprehensive lecture on the elementary principles of electricity, and the explanations are made clear to him by these demonstrating devices. This constitutes the elementary course in electricity, and after the lecture course is completed the student must receive a passing mark of 75 per cent on the examination before he can pass to the rest of the course.

He then enters the practical work, and following him through the course it will be noted that he is put through a course of block testing, valve grinding, etc., as listed in the mechanical department, while in the electrical department he goes through the various units, getting practice in tearing these down, detecting troubles and remedying them. The advanced electrical equipment has been mentioned, and in each case the student is made familiar with every minor adjustment and repair on these systems by being compelled to do the actual work himself.

Every division of the course, such as vulcanizing, battery work, etc., is covered first by lectures which bring out the fundamental points of the question, and then the student gets the practical experience by doing the jobs himself from beginning to end.

After he attains proficiency in each division of the work he is O. K.'d by the instructor and passed to the next step in his course. He does not get his diploma until he has received an O. K. in every division of the work.

The course is designed to be practical throughout, a particular example being in the brazing, welding and cutting departments. This course is separate from the motor car course and covers acetylene brazing, welding and cutting thoroughly and exclusively. The student handles the torch and metal himself, getting actual experience in welding broken parts, iron, steel, brass and aluminum. The equipment of this department includes twelve independent brazing and welding outfits, including the Prest-O-Lite, the Oxweld and the Bishop-Babcock-Becker. The course is separate because it is considered a separate trade, and it takes six or eight weeks to finish it.

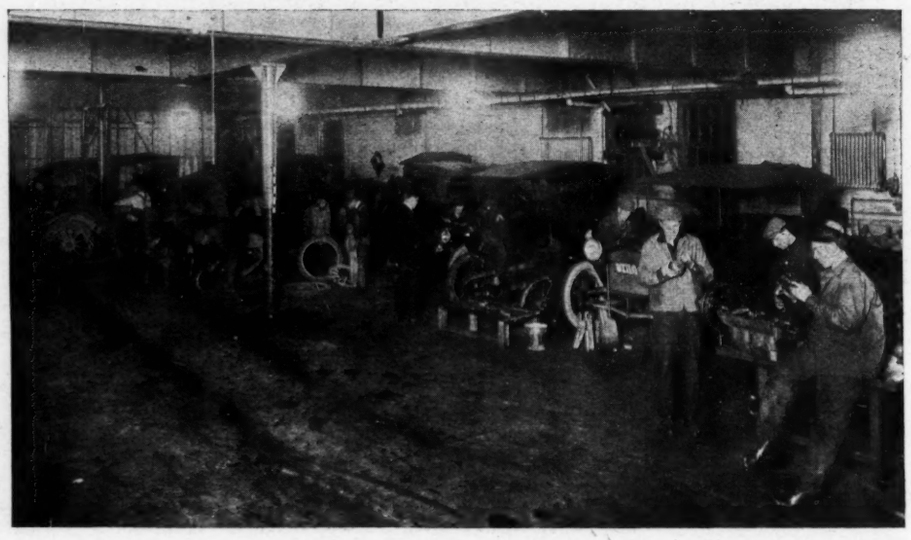
The tuition for the complete welding, brazing and cutting course is $65 cash or $75 on time. The student is given a lecture in the theoretic end, in which he gains a knowledge of the temperatures employed, the characteristics of the ox-acetylene frame and jet before he finally learns the work itself by handling the instruments. If this course is taken in connection with the motor car course a discount of $15 is made, making the total for the two courses $150.

Another department which is frequently inquired about is the tire repairing. A light tire repairing department which takes care of the work ordinarily done on the road or in small garages is included in the motor car course. To have a thorough tire course requires an independent series of studies, and such a department has been installed for those who wish to take a specializing course of six or eight weeks duration.

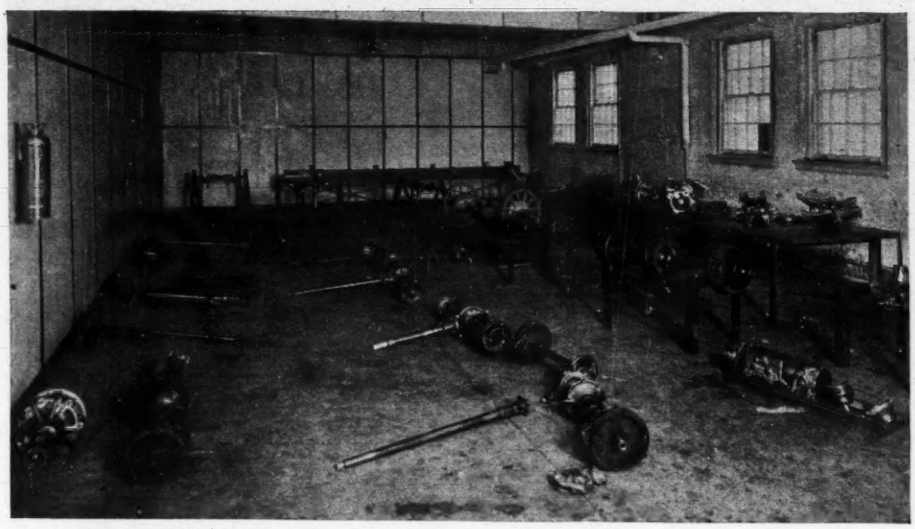
New Tire Equipment

The Michigan State Auto School has just installed several thousand dollars worth of new tire repair equipment and stock. The preliminary lectures teach all the rubber tire fabrics, etc., the causes of different tire troubles and the repairs, showing how to strip the casing, retread the tire and make all tube repairs.

After thorough ground work has been laid in the lecture course the students do the actual work on tires, and a graduate will be capable of opening an exclusive tire repairshop or of taking a position in a tire factory. The large tire factories have as-



Owners' cars are brought into this repair department and repaired at nominal cost



The units in the transmission and axle department give the students material for practical work

sured the officials of the school that they can take as many men as the school can turn out. The tuition for this course alone is $75 cash or $90 on time. If taken with the motor car course it is $60 or $160 for the two courses. If all three courses are taken—the motor car, brazing and welding, and tires, the total is $210.

HURLBURT RAISES PRICES

New York, April 6—The Hurlburt Motor Truck Co. will increase its prices May 1 approximately 10 per cent. On that date the following prices will prevail: 1½ ton, $2,350, raised from $2,250; 2 ton, $3,300 from $3,000; 3½ ton, $3,850 from $3,500; 5 ton, $4,600 from $4,250, and 7 ton, $5,500 from $5,000.

MAYO RADIATOR SOLD

New Haven, Conn., April 6—The Mayo Radiator Co. has been sold to interests identical with the Marlin Arms Co. and will be continued as a separate concern under its present name with enlarged capital. V. J. Mayo, who founded the Mayo company, retains a part in the direction of the concern and will supervise the expansion of the business.

Factory additions will raise the output from 400 radiators a day to 1600. The company expanded its business last June and went into temporary receivership proceedings last December after the readjustment. The difficulties were purely in the organization, it is said, and the company has had a very prosperous year and now is reported to be in the best condition since its formation twelve years ago.

NEW TRUCK LESS THAN $500

Detroit, April 7—E. T. Ross of the Ross Engineering Co., Detroit, is connected with a large concern which will commence the manufacture of a truck to sell for less than $500 soon. Mr. Ross has asked for bids for parts and materials for 50,000 trucks. The company with which he is affiliated has purchased the Knox plant at Springfield, Mass., which it will use for its factory. The truck will have a floating axle, multiple disk and other features unusual in a truck of that price. According to Mr. Ross it will have a wheelbase 6 in. longer than that of the truck which the Ford Motor Co. is arranging to produce.

WHITE CO. ANNUAL REPORT

Cleveland, Ohio, April 6—The White Co. earned 23.13 per cent on its capital stock in the last year. The first annual report of the White Co. for the year ended Dec. 31, 1916, shows net profits amounting to $4,441,041, from which $740,000 has been set aside to reduce value of inventory to value based on prices current to Dec. 31 1915. This leaves $3,701,041, equivalent to 23.13 per cent on $16,000,000 capital stock outstanding. Currents assets, as of Dec. 31, 1916, were $11,674,873, and current liabilities were $1,579,267, leaving net working capital of $10,095,606.

PATENT DISPUTE ADJUSTED

Chicago, April 10—The Standard Varnish Works, New York, and the Wenborne-Karpen Dryer Co., Chicago, have reached an agreement in the differences as to patent matters concerning apparatus and processes for drying varnish, and the Standard will make a settlement for drying rooms installed by it and its subsidiaries in the past and future.

The Wenborne-Karpen patents are claimed to cover any process in which varnishes and other siccative coatings are dried by heated and moistened air, no matter what type of apparatus may be used for that purpose.

ROST G. S. M. DUESENBERG

N. G. Rost is the general sales manager of the Duesenberg Motors Corp., the refinancing story of which MOTOR AGE published April 5. The name appeared incorrectly as N. G. Rose.

A cut-away chassis helps in demonstrating before this class in the mechanical lecture room

Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the thirty-eighth installment of a weekly series of articles begun in MOTOR AGE *issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.*

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors were explained. A section on generator output was followed by one on the purpose and operation of the cutout. The section on Engine and Motor Connection began March 1 and was preceeded by one on Electric Motors.

Part XXXVIII—Motor and Engine Connection—Drives for Generator

THE generator may be driven by a small belt which runs over a small pulley connected directly on the engine shaft, or the pulley may be connected to the pump or timing gear shaft. In some cases the belt used in operating the cooling fan for the engine is increased in length and made to travel around a small pulley mounted on the end of the generator shaft. Care must be exercised in this particular type of drive to be sure that the belt is always tight enough to prevent an undue amount of slipping. Some special means usually is provided for taking up a reasonable amount of slack in the belt by moving one of the pulleys over which the belt runs or providing an idle pulley whose position may be changed as conditions demand. An example of a belt drive is shown in Fig. 222, which depicts a belt-driven generator as installed on a Ferro eight-cylinder engine.

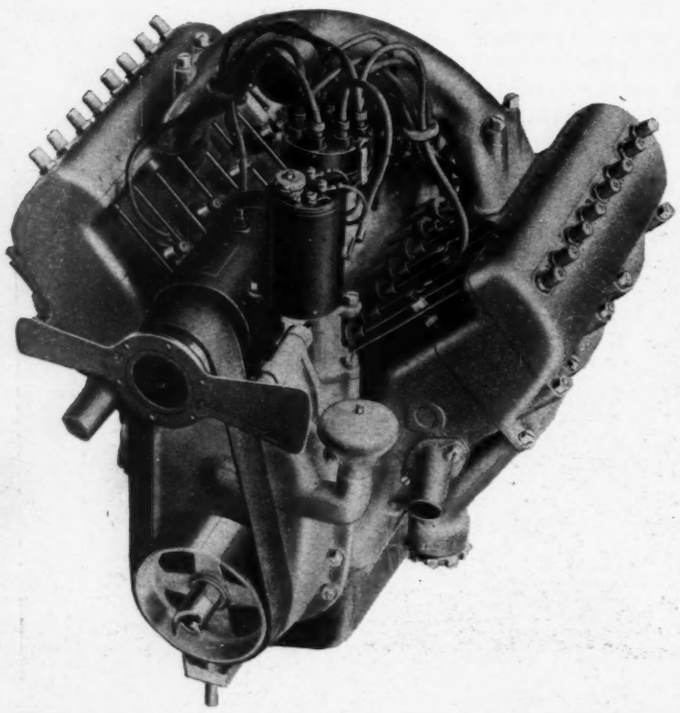


Fig. 222—Belt-driven generator as installed on a Ferro eight-cylinder engine

Chain Drive for Charging Generator

The chain drive has several advantages not possessed by the belt drive, and some of the more important ones are as follows: A positive connection between the generator and the engine at all times; no stretching and hence no special attention is necessary to keep it in adjustment; it may be inclosed and thus better protected and at the same time easily lubricated. Such a drive is the short chain at the left of Fig 223, which is a Colonial eight. All chain drives, however, are not inclosed, especially the earlier installations. An example of a chain drive in which the chain is exposed is shown in Fig. 224, which depicts a Splitdorf-Apelco dynamotor as originally installed on a Ford car.

Gear Drive for Charging Generators

The gear drive provides, as in the case of the chain drive, a positive connection between the generator and the engine crankshaft. In the majority of cases, when the generator is driven by gears, use is made of the timing or pump gears and the generator directly connected to the end of a shaft on which these gears are mounted or to one of the shafts through a gear mounted on the generator shaft. The installation of a gear-driven generator on a new engine design is shown in Fig. 225. The small gear at the bottom is on the generator drive shaft.

Mounted Directly on Engine Shaft

The best example of this particular type of installation is that of the U.S.L. system in which the generator and motor are combined in a single unit and mounted in the fly-wheel housing in place of the flywheel itself.

Combined Generator and Motor Drives

The generator and motor drives may be one and the same drive. In some cases there are two drives between the dynamotor and the engine, the gear ratio of the two being different. One of these drives will transmit power from the dynamotor to the engine while the armature of the dynamotor tends to run, due to a motor

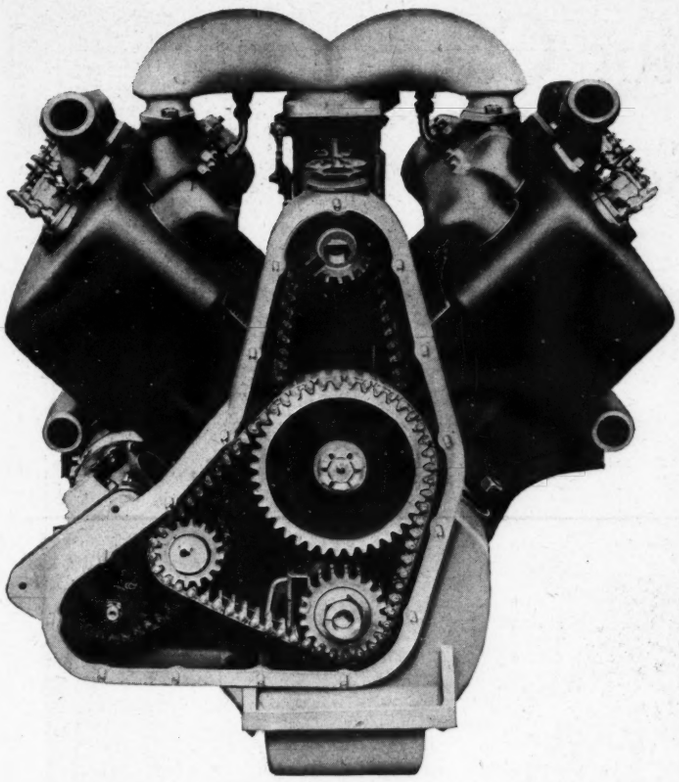


Fig. 223—Chain drive in which the chain is inclosed as installed on a Colonial eight

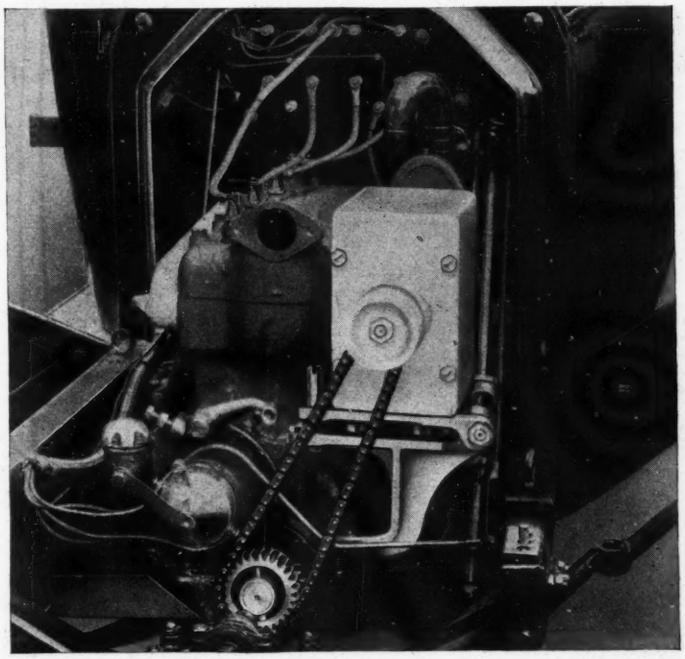


Fig. 224—A Splitdorf-Apelco dynamotor as originally installed on a Ford, showing a chain drive in which the chain is exposed

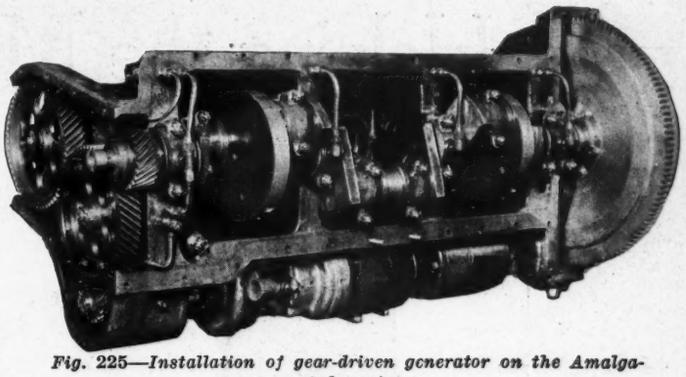


Fig. 225—Installation of gear-driven generator on the Amalgamated engine

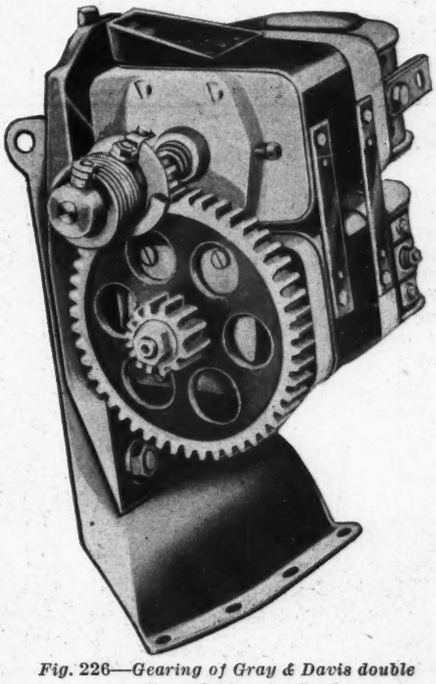


Fig. 226—Gearing of Gray & Davis double unit outfit for the Ford

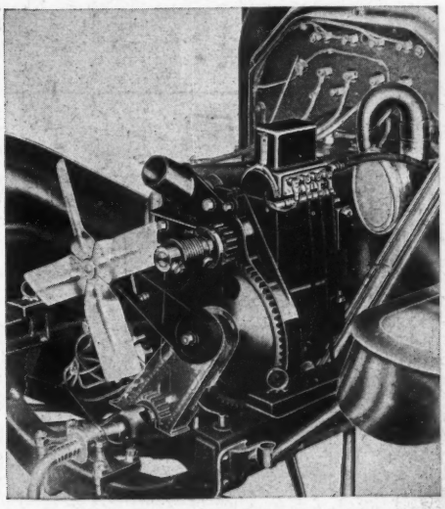


Fig. 227—Heinze equipment for Ford, in which the primary drive is by chain

action, ahead of the engine and is used in starting the engine. The other drive will transmit power from the engine to the dynamotor when the engine tends to run ahead of the armature of the dynamotor. In some cases a part of the connection will be used in transmitting power from the armature of the dynamotor and also in transmitting power in the opposite direction. In such a case an intermediate gear or sprocket is connected to the shaft of the dynamotor through a double roller clutch a part of which will drive in one direction and the other part in the opposite direction. An example of this type is shown in Fig. 226, which shows the gearing of the Gray & Davis double unit outfit for the Ford. The armatures of the generator and motor are connected when the motor is in operation by the large gear and Bendix pinion. This connection becomes inoperative, however, when the motor circuit is opened and the pinion and gear disengage. A similar installation in which the primary drive is by chain is the Heinze equipment for Fords illustrated in Fig. 227.

Helping the Motor Car Recruit U. S. Soldiers

To the right you can see the crowd that has been attracted by the car and its speaker. This is a typical scene in the larger cities now. The car's insignia shows it is seeking sailors for the navy

The miniature battleship below adds its force to the naval recruiting scheme in New York. The scheme is a part of the activity of women in recruiting all over the country

Chicago's women wear khaki also when they help the recruiting cars attract soldiers for Uncle Sam

One way in which the women are acting as aids to the motor car in their work is by offering their cars to transport sailors and soldiers from place to place. They are the chauffeurs also

The Motor Car Repair Shop

Easily-Made Wooden Repair Stands

Removes Crankshaft Bearings

BROOKLYN, N. Y.—Editor MOTOR AGE—The following method has been found to be a very simple and efficient one for removing a ball bearing type crankshaft, and minimizes the danger of breakage of parts. When the engine has been disassembled and the crankshaft is ready for removal, take an ordinary gasoline blow torch and heat slowly and evenly the surrounding crankcase and the metal case surrounding the ball races which acts as a retainer. This ordinarily is of aluminum and expands considerably faster upon being heated than the steel ball races, thereby releasing them somewhat. Having heated the case thoroughly, take a block of wood and hammer, (wood preventing shaft being damaged by blows), and drive shaft out slowly from one end, striking very light blows. Upon replacing, the same idea may be used, heating the case and then driving the shaft in.—J. Edgar Finn.

Removes Battery Connector

EDITOR MOTOR AGE—I give you a description of a little instrument that has been very useful to me, and may prove so to some one else.

I live 30 miles from a Willard service station, and recently I had to remove the battery from my car to send it away for repairs. I found the connector so tight in the battery post that it was impossible to remove it, and I had to cut the wire to get the battery out of the box.

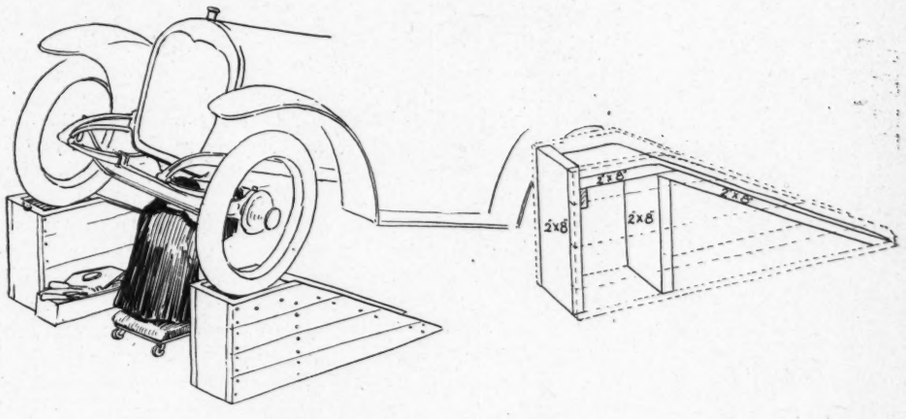
Anticipating this same trouble again, I got a blacksmith to make me a pair of ordinary blacksmith's tongs 20 in. long. The handles are ½-in. iron and one of the jaws ½-in. longer than the other.

The longest jaw is 3 in., and has a slot in it to let it go over the battery cable. The slot is 2 in. long by 1½-in. wide, and by backing off the screw in the end of the connector a little power will get the connector out easily.

This will not benefit anyone who lives near a service station but lots of people will find it very useful, as I have used it a number of times.—Edwin D. Shafer.

Removes Radiator Scale

MINNEAPOLIS, Ind.—Editor MOTOR AGE—For taking the scale out of radiators, mix 1 qt. sweet milk to each gallon of water, have the solution boiling hot and fill radiator two-thirds full; run the engine for 20 or 30 min., then drain and wash out with clear water. This will loosen all rust and scale caused by hard water or alkali. I have used this on Ford and Scripps-Booth cars. This will do the work when other solutions or boiler compounds fail. It will not injure any part of engine or radiator.—S. M. Dunbar.



Repair stands made from 2 by 8 planks and 1-in. siding

Wooden Repair Stands

AN easily constructed repair stand equipment is illustrated on this page. It is made up of wooden framework using 2 by 8 planks with 1-in. siding to make the stands rigid. A grade of 25 or 30 deg. is an easy ascent for a car and the stands should be made accordingly.

It would be well to let the siding hang over about an inch on the runway sides and on top to hold the car in its course should it be guided carelessly up the runway. Stands of this pattern are being used for repair purposes in the Maxwell plant in Detroit.

Finding Polarity of Wires

WEST LIBERTY, Ohio—Editor MOTOR AGE—Referring to the communication from James H. Webb on finding polarity of wires by use of potassium iodide, in the March 22 issue; a much more available method is to use a solution of common salt in water, the stronger the better. Dip the two wires in solution and from ¼ to ½ in. apart. The positive terminal will give off a spray of gas bubbles, the intensity or amount of the bubbles depending on the strength of the current and the distance between the terminals, and will be plainly visible. The negatives remain inactive.—B. S. Elliott.

Protection Against Fire

DAVID B. ROBERTS, general manager of the Hartford Buick Co., Hartford, Conn., has rigged up various tools for his especial purpose. Among them is an overhead trolley drop light which may be run from one end of the 200 ft. building to the other. To protect the place from fire Roberts has suspended from the ceiling a half dozen Pyrene fire extinguishers. These are attached to cords by means of fine, coiled copper wire. The Pyrenes are within reach of the hand and when grasped the wire unwinds. They are so placed as to afford the best protection.

Cures Missing Studebaker

CULVER, Ind.—Editor MOTOR AGE—Some time ago I had considerable trouble with the two rear cylinders on a Studebaker 4-40, 17 serial, missing irregular. After cleaning and testing the spark plugs, testing the ignition, cleaning the valves, nad readjusting the carbureter I had the same results.

The Studebaker is equipped with a Stewart vacuum system and after disconnecting the tube which connects the vacuum tank to the intake manifold which enters the two rear cylinders the engine began to fire regularly and perfectly for a minute. I decided to drill a hole just above the carbureter and tap it with a ⅛-in. pipe tap and connect the pipe from the vacuum tank to this opening. After I had it completed the engine ran splendidly with power and speed. I have no more missing cylinders.—Ralph Cook.

The Art of Driving

America's Women Are Cultivating This Skill as Never Before—Pictures Tell Why

THAT there is an art in driving have no doubt. Even believe that the art is increasing constantly in its desirability. For as the traffic on the highways and the byways of a growing country becomes more and more condensed, it requires art in driving to be a part of it. And a good driver always is a part of the traffic and not a contrary-Mary, what-do-I-care-for-the-traffic-whistle ego.

The first time a woman drives her car with no one in the coaching box she has very little, if any, confidence in her ability, no matter how well or how long she has been instructed. Unless she is on a wide and deserted country road she finds it extremely difficult to avoid a few vehicles and obstructions to the progress of the car. And even on a wide and deserted country road she finds the wide expanse all too narrow.

Always a Lack of Confidence

Her difficulty lies in her lack of confidence. The same difficulty figures in the other arts, fine and applied. Only, in driving, more of the world gets the effect of it. If the beginning art student makes the feeble, ineffectual line that fails somehow to give the desired strength to the politician's portrait, it is a narrow, understanding world—the classroom—that knows it and cares. Let a driver make an uncertain line down a crowded street—well, really, it isn't done, especially if it's a city street.

So, you see that there is an art in driving, and an art that it would pay any woman to cultivate in this day of motoring and driving.

It is hard, you will admit, especially if you have been there yourself, for the novice to remember even the most simple of her instructions when she must change speed or pass another car. This is true even though such times are the times of all times at which she should remember her instructions. But the ability to judge distance and speed and the automatic control that comes with driving are only to be earned by actual experience and careful observation, combined with intelligence. And it is in the cultivation of this ability to judge and the automatic control that the art of driving comes in.

It used to be that you could count on your fingers all the cars in a town of 10,000. Can you do it now? True, you can count on your fingers all the women who drive in the town of 10,000, and if you are one of them they are probably all friends of yours. But will you be able to do it always? Judging from the growing list of women who drive their own cars you will not be able to do it always, or long. Fewer artists are born than tradition has had it, and just as other arts are sponsored and adopted so is the art of driving being adopted by the woman, and it is being adopted by cultivation and by an intelligence that makes, lack of confidence nonexistent in the face of it.

Women are not noted for their mechanical turn of mind. If a housekeeper waits for the electrician to come and repair the burnt-out fuse in the ordinary drop light in the pantry, which the mere man could but hasn't time to attend to, her lack of mechanical competence in the instance is more than expected. In fact, if she repairs it, the marvel is she wasn't shocked to death! But all that is changing, and perhaps no one thing has more to do with it than the art of driving.

Some of those who have captured the art—Motor Corps A, composed entirely of women and the only organization of its kind in the country. It is now on duty in Boston

From the Woman's Viewpoint

Ability Is Apparent

With the coming and the growing of the motor car and its activities she has demonstrated quite often her ability to master the gasoline engine and make herself a most excellent artist in efficient and successful driving. She may not fit herself to be a skilled mechanic, but she does fit herself to understand more than the superficial technicalities, so that she gets a good working knowledge of the features of the car she is most concerned with in driving and is able to apply this knowledge when the time and the occasion demands it.

Greatly to be desired is it that as the motor industry becomes more and more a part of the American and world life that the women of the land gradually become imbued with inherent mechanical ability, but until they do the best thing that will take its place is the use and development of the ability already possessed and the cultivation of them into that which makes for efficient driving.

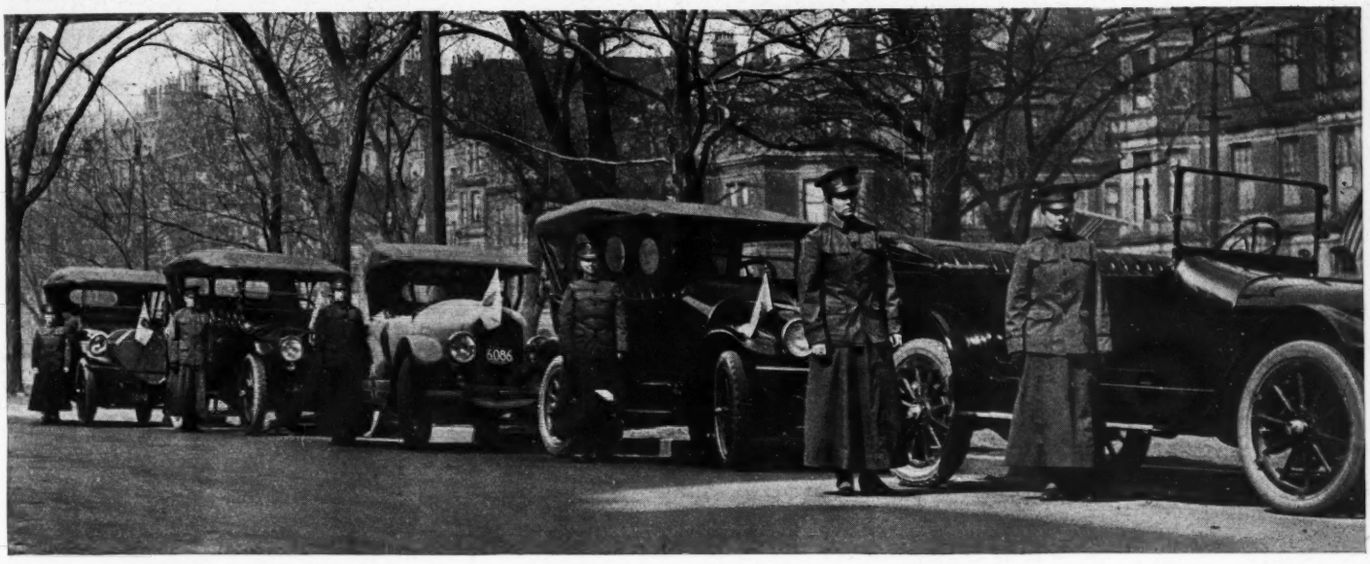
There are women who have this inherent mechanical ability. They are the ones who talk about how easy it is to drive, they can't see how anyone would be afraid to be caught out on the road with a balky engine and so on and so on. Most of these, after driving a few months, exhibit such a knowledge of the mechanical parts of the car as is usually accredited to trained mechanics only. The rest of them break up the cars through accident or other reasons—and drop out of the driving lists.

Athletics Seem to Help

But there are just as many, and perhaps more, women, equally intelligent and learned in matters not technical, who never thoroughly understand their cars and who always are having bad luck in driving.

The woman who is more or less athletic seems to realize more quickly the art of driving. Perhaps it is that she has some unaroused mechanical ability. Or, more likely, perhaps it is that her friend, the woman who knows what the best seller is, in that she always has it, and embroiders a little, plays bridge a bit, being less used to physical activity gains less quickly the confidence so necessary to any art, and to motoring in no less degree.

The ability to run a car as long as it is all right can be acquired easily and readily.



When Massachusetts called for troops, Motor Corps A was ready for service. The members drive the cars and provide transportation for the National guard officers. Captain Frances Gray is commander of the corps

And it is acquired easily and readily. As witness the boast of that one who takes the wheel for the drive back home on the first time out with the salesman. But this is not the art of driving. One might learn to run a car the first day and not know how to drive it ever. The art is cultivated only by systematic study, persistence and determination to learn. The steering wheel is not very exorbitant in its demand of operation. Spark plugs can be changed by a less than expert. It is the culmination of all this and more that makes the woman, or man, an artist in the art of driving.

Definition of This Artist

What is an artist in the art of driving, somebody might ask? Well, there is no diploma for the artist and no national gallery for exhibitions of skill. But the artist of this activity meets every emergency with intelligence and speed and is a capable operator of the car through study and experience. She, or he, has become acquainted with the mechanism, the adjustments, the principles and the whys and wherefors of the product of skill she is using.

There is a great difference between running a car and driving a car. To run it you merely follow a certain series of steps which cause the car to start, stop, slow down, speed up, reverse, turn to right and left as desired. But to drive involves judgment, skill, foresight and an unconscious tendency to synchronism of mind, eye, hand and foot, together with some mechanical skill and knowledge.

Too many learn to drive a car from the wrong end of the row. The mechanical details of the car should be mastered before, not after, the would-be driver has steered his somewhat uncertain way down the road. Because it is possible to drive for miles, and years, without the least knowledge of the details or construction of a car or why a certain operation produces a certain effect, it is done, and done too often. For, when anything happens, which it generally does, a good working knowledge of the essential mechanism is of inestimable value.

You do not have to know everything about the engine, transmission, differential and the thousand and one other details. Some of the parts, though, sooner or later will need your personal attention, and if you know nothing about them they will need it in vain. Certain details are connected so closely with ordinary driving that they should be mastered, if you are to recognize the art of driving at all.

The best way you can start out to master the art of driving is to have someone who is experienced and competent go with you and explain every step in the process of driving. It is not absolutely necessary, however, that you follow this plan. It will make it faster for you, though, and you will be more apt to learn things in their logical sequence rather than in a mass.

Until you have mastered the rudiments of driving it is best, for you and for everybody else, that you avoid the traffic of the streets. Most owners are too anxious to drive along the roads or through the streets and start out long before they are ready. No wonder then, is there, that they become rattled and forget their instructions when occasion arises for them to observe them. For instance, if a new owner becomes thoroughly familiar with the handling of clutch, gears, brakes and so on before going out on the road, she then can give her entire attention to steering and will not have to look or feel about for the levers and pedals.

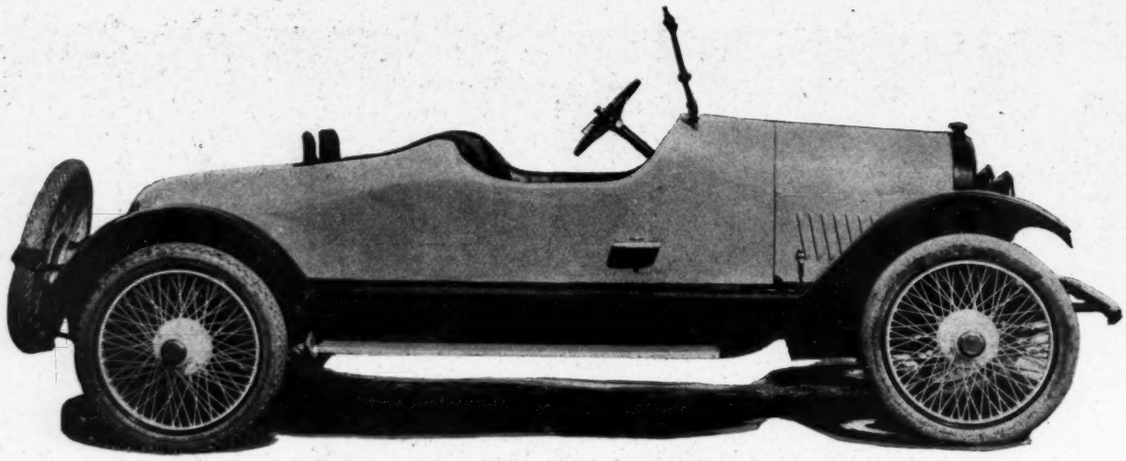
It is not only best but wisest for a new driver not to try to drive through congested thoroughfares. When enough skill has been acquired to attempt the heavy traffic even then the greatest care must be used, turns must be made slowly, obstructions must be avoided with ample leeway and the driver must be ready at any time to slow down when doubtful as to what course other vehicles will take.

The ease of driving will seem ready to the touch when you first get hold of the steering wheel. The slightest turn of it brings a response so quick as to be rather upsetting to the mental balance of the new driver. A wide road in this part of the art's cultivation is essential. It will take experiments to steer properly. No matter how carefully you have observed drivers before you as to just how far forward and how far backward they turn the wheel when rounding a corner, you will find it all different when you yourself take the wheel. One reason for this is that probably you will not be able to put your observations into effect for some unforeseen cause. It always is hard to foresee what will make you forget your instructions when you are a new driver.

Long Practice Best

Changing of gears takes practice before you can do it even to your own satisfaction, much more to the satisfaction of the expert, whose benefit you are getting presumably. The best practice is that of starting, backing and turning, actually changing gears not once or twice but several times. By doing these things often enough they will become almost mechanical finally, another consummation devoutly to be wished.

Before starting out make it a practice to examine the lubricator and grease cups. The wearing parts of the cars should be well oiled. Fill the radiator with water. Have plenty of gasoline. And it would be better if the gasoline were strained, as grit and dirt clog the carbureter. See that the tires are properly inflated and in good condition. It wouldn't be at all bad to examine the brakes and see that they grip and release readily. If the tire is not inflated properly it will wear out sooner. Besides, a sudden blowout may cause the car to skid or even upset.



Two auxiliary seats which fold into the rear deck when not needed make this a four-passenger speedster

Racing Lines on Yale Eights

New Four-Passenger Speedster

TOURING car, roadster and speedster models selling for $1,550 with standard equipment and $100 extra for wire wheels are new offerings on the Yale Eight chassis, a product of the Saginaw Motor Car Co., Saginaw, Mich. This is an assembled car made up of standard units including such parts as Perkins engine, Munice gearset, Timken axles, etc.

With a bore of 3⅛ in. and a stroke of 4½ in., the eight-cylinder Perkins powerplant gives a formula rating of 31.25 hp. This engine is the standard type bearing the two blocks at an axle of 90 deg. with the valves in the V. Cooling is by a thermosyphon system in connection with a Long thin tube radiator. The powerplant is in unit with the gearset and the crank case and gearset castings are of aluminum.

Crankshaft bearings are 1⅝ in. diameter and have a length of 2⅜ in. at the front, and 4¼ in. at the rear. The lower connecting-rod bearings are 1⅝ by 2⅜ in.; drive is conducted through a multiple-disk clutch to a selective three-speed gearset, with final drive through two universals and a propeller shaft to a Timken floating rear axle. Torque and propulsion effort is taken through the springs by the Hotchkiss principle of drive. The springs are three-quarter elliptic.

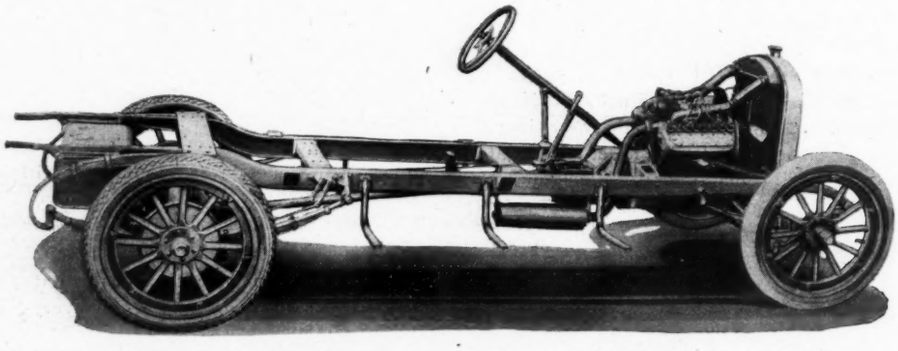
Internal and external brakes of conventional pattern are fitted, operating on a single drum in each wheel. The rims are of the Firestone demountable type, fitted with 34 by 4 in. non-skid Goodrich tires on the rear and plain tread Goodrich in front.

The Zenith duplex carbureter furnishes gas, and the gas is ignited by the Remy distributing system. For starting and lighting there is a two-unit, six-volt Remy outfit used in connection with a Willard storage battery.

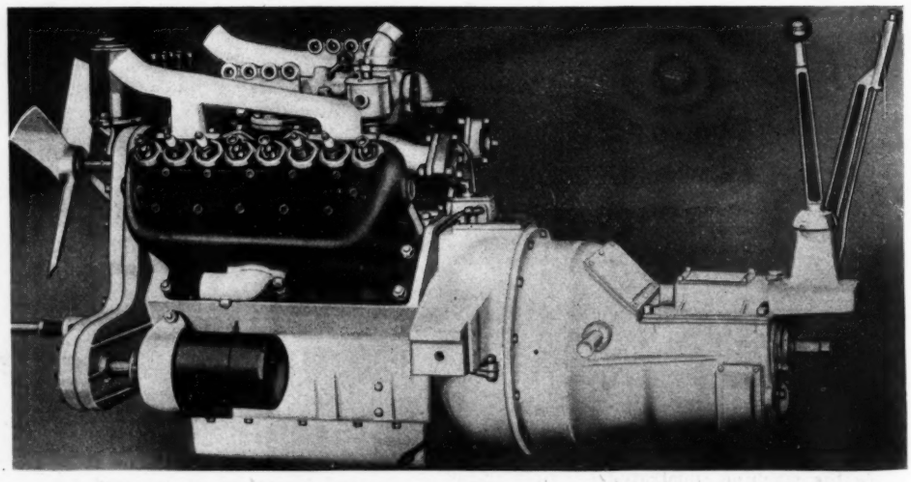
A Lavigne steering gear is used, carrying the spark and throttle control on top of an 18-in. corrugated steering wheel. This has an electric horn button in the center of the wheel and an aluminum spider.

The body designs are striking and distinctive as will be seen by a glance at the illustrations on this page. The touring model has a seven-passenger capacity with the auxiliary seats folding in to the back of the front seats.

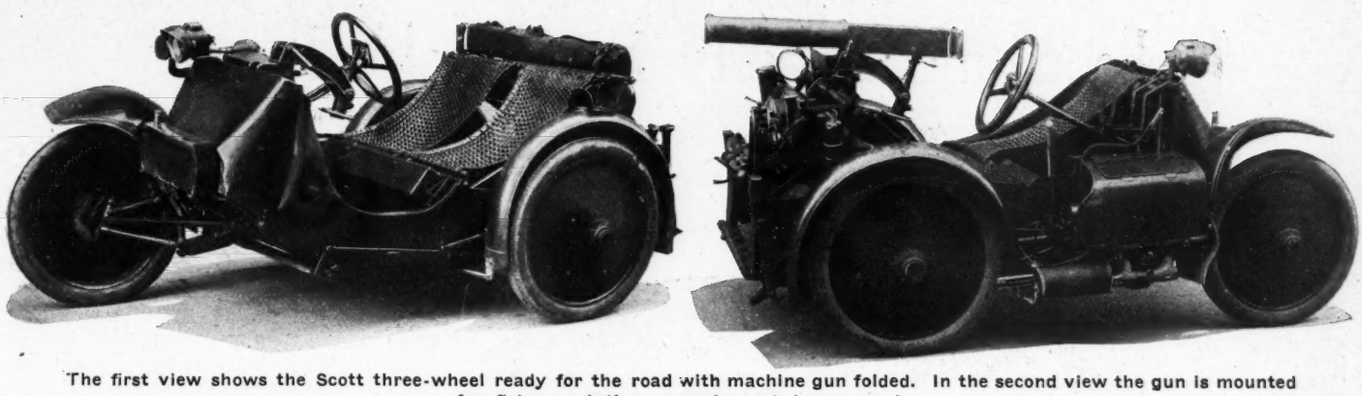
The speedster model has no doors but a step on the side of the body instead. There are two auxiliary seats behind the driving compartment which fold into the rear deck when not needed. There is also a two-passenger roadster with the same general lines as the speedster except that it is fitted with doors and a top. The touring car can be supplied with a permanent top for $50 extra. The standard color options are white and black, or Yale blue and black, and the equipment includes a full set of lamps, Stewart-Warner horn, slanting windshield, one-man top and the usual complement of tools.



Yale Eight chassis on which the touring car, roadster and speedster models are offered



The assembled car includes a Perkins power plant that has a formula rating of 31.25 hp. It is in unit with the gearset



The first view shows the Scott three-wheel ready for the road with machine gun folded. In the second view the gun is mounted for firing and the gunner's seat is reversed

Machine Gun Carried on Three Wheeler

Quick Action Possible with English Machine

THE SCOTT two-track three-wheeler is a development from the sidecar combination and is specially built for transporting a small machine gun and its operator. Although its appearance is freakish at first glance, there is a reason for all of this freakishness which will be understood after reading the description.

The reason for three wheels is that weight is saved, the machine will turn in a trifle more than its own length and there is no need for a reverse gear. The third wheel is a weight carrier only and the machine can travel over rough going with no frame distortion.

Frame Made of Tubes

In this frame is found the most interesting feature of the car. It is made up from tubes of three different lengths; each tube has an eyepiece at each end and the different tubes are bolted together by means of the eyes. This means that three spare tubes can be carried and any tube in the frame can be replaced very quickly. The front portion of the frame which supports the front wheel is hinged to the main frame and is also made up of three tubes. The claim is that it is possible to assemble the whole frame in 15 min.

Another feature for ease of replacement is found in the springs which are of the spiral type maintained in tension. The swing bracket which carries the front wheel is linked to the main frame by one set and the rear axle controlled by another set of coil springs hooked onto the respective parts. It is claimed that this suspension gives very easy riding and probably the comfort is due in a considerable measure to the hammock seating arrangement as seen in the illustrations. These seats are naturally of a very light weight and quickly removable.

Scott is an English maker of two-stroke motorcycles, and one of these powerplants is used in the car, although any compact engine and gearest would be applicable. In the machine illustrated on these pages the engine has a 3 in. bore and 2½ in. stroke and is rated at 5 hp. There are three speeds in a casing which is in unit with the engine, the ratios being 5, 7 8-10 and 14 8-10 to 1. In unit with the powerplant is the magneto and in fact, everything except the radiator so that it is a simple matter to install a complete new unit. Drive to the rear wheel is by propeller shaft through bevel gears.

There is an unusual brake layout; the hand brake is on the wheel driven by the engine, this being of the expanding type and inclosed. On the side wheel, which is a free wheel, the foot brake is mounted, this being of the same dimensions as the hand brake, although there is no interconnection. The idea is that the foot brake is most used and the engine also has a braking effect so that the engine brakes one wheel, while the foot brake acts on the other, so eliminating any effect on the steering.

The gun mounting is so arranged that it can be fired forward or aft from the car and the gunner's seat is reversible so that he can sit either way. In a very short time the gun can be removed from the machine and set on legs. The weight of the gun and machine equipment is about 1000 lbs. made up as follows:

Gun and 1500 rounds ammunition	205 lb
Gun tripod	48 lb
Two men	308 lb
Complete machine	476 lb
Spare wheel and tire	22 lb
Spare parts for machine	20 lb

The construction of the machine is covered by American patents which are in the hands of Peter Frasse & Co., New York City.

The machine gun carried on the Scott three wheeler can be removed quickly and placed on its own standard

PYRENE EXTINGUISHER $2 MORE

New York, April 6—The Pyrene Mfg. Co. will raise the price of its fire extinguisher from $8 to $10 May 1.

LEXINGTON SIX HIGHER

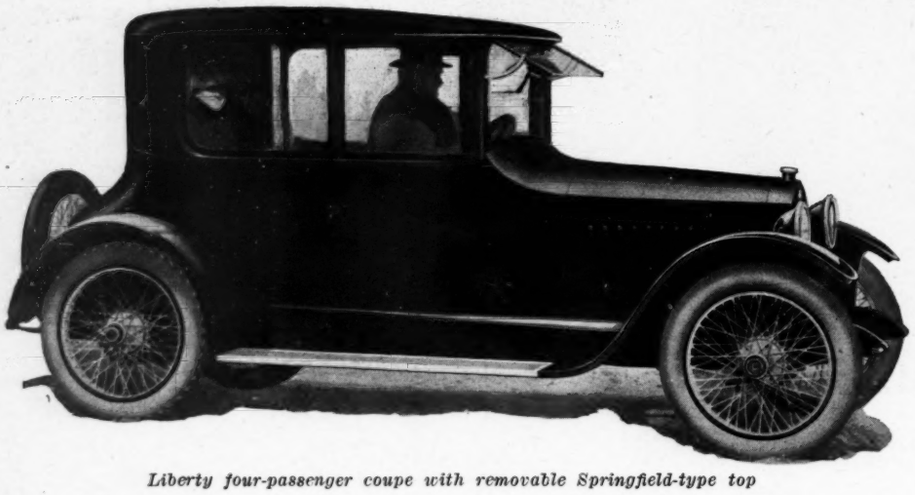
Connersville, Ind., April 7—The Lexington-Howard Co. has increased the price of the Lexington Minute-Man Six from $1,185 to $1,285.

PAN-AMERICAN TO MOVE

Decatur, Ill., April 7—The Pan-American Motor Co., recently organized in Indianapolis, Ind., will move its headquarters to Decatur, Ill. The capital stock has been fixed at $1,000,000, half of which, it is claimed, has been subscribed. Plans are now being drawn for buildings. The first unit will cost $50,000.

The Pan-American company will put out four styles, a five-passenger, six-cylinder, 40 hp. touring; a four-passenger coupe; a roadster; and a speedster. The price for each will be about $1,250. C. V. Morse is president of the company; W. A. Phares, treasurer; William Hullin, secretary; A. Duplissis, assistant secretary; and A. B. Hyatt, sales manager. Next year the company proposes to manufacture its own engines at Decatur. The Rutenberg engines will be installed in all cars assembled in Decatur this year.

Jackson and Liberty Springfield Types



Liberty four-passenger coupe with removable Springfield-type top

THE Jackson Automobile Co. has expressed its faith in the popularity of the all-season sedan by bringing out at the opening of the spring season a convertible model with several unusual features. The bodies are being built in the Jackson shops under Springfield patents.

In this sedan body, staggered doors are fitted. There are two doors which are offset from one another; one is conveniently placed at the right side so that the rear seat passengers can step in or out with ease, and the other is at the left side on a direct line with the driver's seat, so that the driver can enter or leave the car without passing in front of the rear seat passengers. Both doors are actuated by positive push button locks.

There is an exhaust heater with a register in the front compartment and another in the tonneau, either or both of which may be switched on or off by a slight movement of the driver's foot. A dome light in the center of the tonneau is controlled by buttons placed within easy reach.

The front seats are of the Pullman chair type and the rear seats have received special attention as regards the curve of the form fitting backs and comfortable arm rests. There is a wide aisle between the front seats and ample room for auxiliary chairs.

LIBERTY INCLOSED COUPE

A Springfield type of coupe with seating capacity of four passengers is a new offering of the Liberty Motor Car Co., Detroit. The car will sell for $1,795 with an option of wire wheels with a spare at $90 extra.

The body is mounted on the standard Liberty chassis and makes an all-season body with glass-inclosed sides or an open four-passenger roadster if desired.

A feature of the body, which may be seen in the illustration, is the long, double side windows which permit wide range of vision. The seats are divided in front. The Liberty touring cars and roadster will also be equipped with Springfield-type tops if desired.

GEM CARS UNDER WAY

Grand Rapids, Mich., April 7—Passenger cars and trucks will soon be shipped from the factory of the Gem Motor Car Corp., Grand Rapids, Mich. The chassis are to be provided by the Detroit Chassis Co., which is reported to have a contract for 1000 of these with deliveries already on the way.

As a touring car, the product will sell for $845, with an open express commercial body for $675; with a canopy top, $700; and with full panel body, $725.

Included in the specifications is a Golden, Belknap and Swartz engine of 3¾ in. bore and 4¼ in. stoke. This engine is rated at 31.9 hp. at 2000 r.p.m. and 36.9 hp. at 2800 r.p.m. It has 1¾ in. valves, three-bearing crankshaft and five-bearing camshaft. The clutch is made by the engine manufacturers.

Ignition is by the Connecticut distributor system. The gear box is a standard three-speed unit integral with the engine.

Gem Motor Car Corp. Soon to Produce

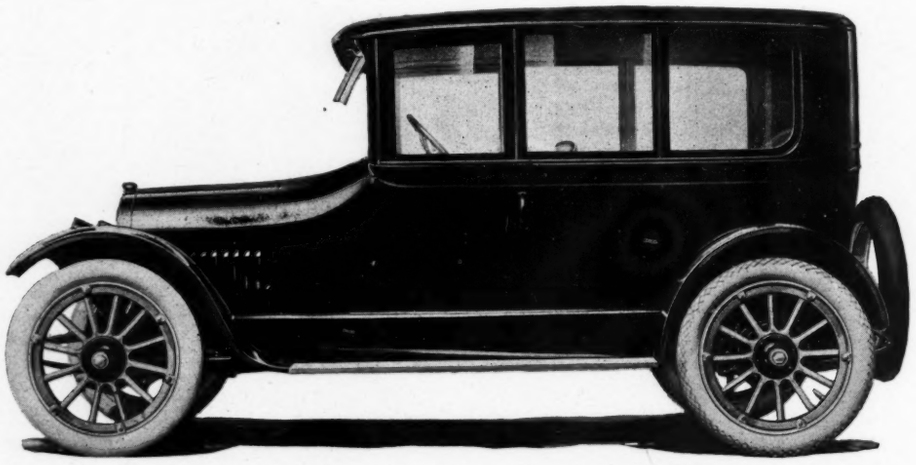
The rear axle is semi-floating on Hyatt bearings with a 2½-in. diameter steel housing and 1¼-in. nickel steel axle shafts. The reduction is 4 to 1, through bevel gears. The pinion shaft is carried on ball bearings; the springs are 35 in. semi-elliptic in front and 48 in. three-quarter elliptic in the rear; the wheel base is 112 in. with standard tread and a 10½-in. road clearance. On the touring car the body is a five-passenger design with Crown fenders and standard color of Brewster green with Queen wheels and nickel fittings.

NEW AIR CRAFT COMPANY

Green Bay, Wis., April 7—The Lawson Air Craft Co., Green Bay, Wis., is being organized with a capital stock of $50,000 by leading capitalists of that city under the direction of Alfred W. Lawson, Detroit, an airplane manufacturing expert and aviator, to establish a plant for the construction of flying machines. Articles of incorporation will be filed April 9, and it is hoped to equip a workshop by May 1. It is said that the company has been assured extensive contracts by the United States government and already has booked sufficient business to run the plant at full capacity for at least a year. Some of the stockholders in the Lawson company are among those who recently organized the Oneida Motor Truck Co., Green Bay, with $300,000 capital, to manufacture motor trucks.

SPRANGER WIRE WHEEL BUILDS

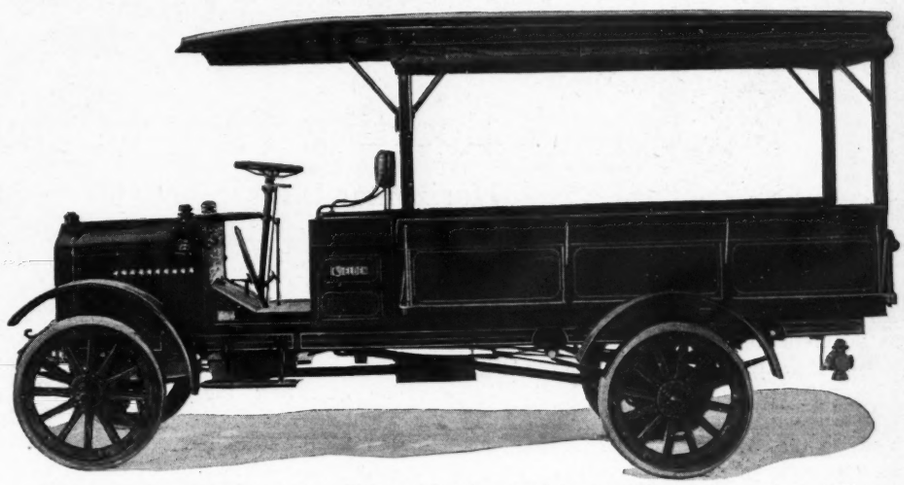
Detroit, April 7—The Spranger Wire Wheel Co. will start manufacturing in its new plant within thirty days, and expects to be working in full force by June 15. The plant will cover approximately 1½ acres.



Jackson Springfield-type sedan with offset doors, one entering driver's compartment and the other entering the tonneau

Selden and Koehler Light Trucks

Adaptable to Express Type Bodies for General Service



The new Selden 1-tonner is for all-around medium haulage and fills out the company's line of models

A TRUCK for all-around medium haulage service is the new 1-tonner marketed by the Selden Truck Sales Corp., Rochester, N. Y. This Selden model fills out the line which consists of ¾, 1, 2, and 3½ tonners, and it sells for $1,385 for the chassis.

The engine in this model is a four-cylinder in unit with the gearset. The L-head cylinders have a 3½-in. bore and 5-in. stroke and the engine speed is governed at 1300 r.p.m. The cylinders are block cast with the valves on the right side. Carburetion is by a Stromberg instrument and a Bosch magneto furnishes ignition. Lubrication is by circulation splash and the engine is cooled thermo-syphonically in conjunction with a V-tube radiator.

Multiple-Disk Clutch

A multiple-disk clutch furnishes drive to a three-speed gearset all in unit with the engine. From here drive is conducted to an internal gear system through a differential, the weight carrying axle being dead. Propulsion effort is absorbed through heavy-semi-elliptic springs, by the Hotchkiss method.

The gear ratios to the rear wheels are: 8.2 to 1 on high, 14.8 to 1 on intermediate and 24.85 to 1 on low. The frame back of the driver's seat in the standard model is 9 ft. 6 in. This model has a 140-in. wheelbase. There is a special model available on a 131-in. wheelbase which has a frame length behind the driver's seat of 8 ft. 10 in. The approximate height to the loading space from the ground when not loaded is 34 in.

Solid tires are used, 34 by 3 on the front and 34 by 4 on the rear. Pneumatics will be furnished special on order. The complete chassis in the large size has a turning radius of 27½ ft., and the tread is 56 in. standard. The gasoline tank capacity is 20 gal. and there is space for 1½ gal. of oil.

A special open express body with canopy top will be furnished at additional cost. Details of this body or blue prints for its building will be furnished.

KOEHLER 1¼ TONNER

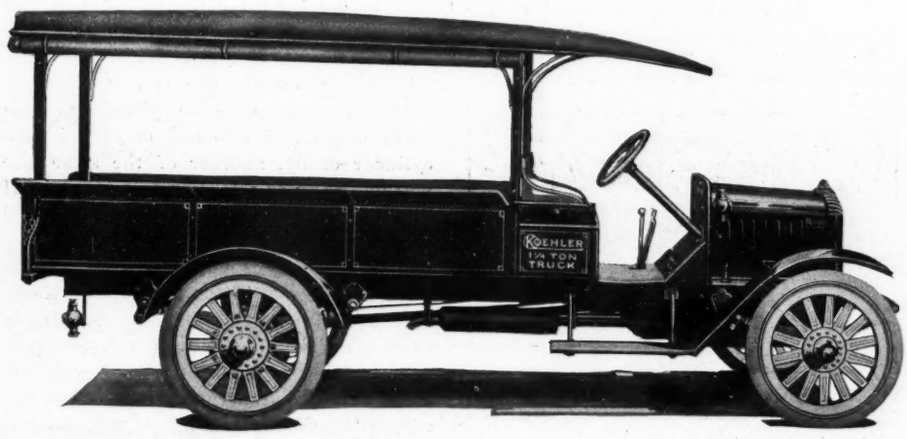
The new Koehler 1¼-ton truck is called the model K-1¼ and supplants the former 1-ton capacity model built for the last year and a half by H. J. Koehler Motors Corp., Newark, N. J. The company is still specializing in one model only, but it is of greater carrying capacity brought about by a strengthened chassis. It is said that between 2000 and 3000 trucks of this model will be built between now and the coming Jan. 1. Material for a large part of this output is now in the factory.

The Koehler four-cylinder 35 hp. overhead-valve engine with increased compression and lighter pistons is enabled to develop an increased horsepower.

The internal-gear-drive of axle is used and the rear springs have three heavy main plates to thoroughly accommodate the Hotchkiss drive and 1¼-ton load.

Rear tires are now of larger size and the front spindles have been increased to a 2-in. diameter. All spoke sizes have been increased.

The open-type express body as illustrated with a four-post top or driver's cab front will be produced in the greatest quantities inasmuch as it has proved to be the most popular style. This body has a loading space of 9 ft. length and the fullest width allowed with standard wheel tread. Either Eisemann or Heinze magneto is supplied and the equipment consists of front or rear lamps, mechanical horn, fenders, artillery seat with lazy back, tools, etc.



The open-type express body illustrated is the most popular Koehler style and will be produced in largest quantities

STUDENTS IN SEARCHLIGHT CORPS

Washington, D. C., April 6—Forty-eight students of the Bliss Electrical School, of this city who are taking courses in electrical engineering, have been formed into a searchlight unit under the engineer corps of the United States Army. The students will handle nine large tractors which have been received in Washington for the use of the engineers corps. Four of the tractors carry searchlight 36-in lenses. Four have dynamos driven by gasoline. One is a supply truck. Clyde B. Creesy, the instructor, is to be commissioned a lieutenant in the searchlight corps.

The engineer corps has needed a searchlight corps, and the organization of the corps of electrical engineering students is expected to supply the demand. The members will enlist for four years, giving two weeks of their time to training in a military camp each year in time of peace and, of course, be ready when needed, to enter active service.

PRICE CORRECTION

The radium steam vulcanizer described in MOTOR AGE of Jan. 25 on page 81 was misquoted as to the price of the No. 6 outfit, as this sells for $150 and not for $130. Attention has been called to it by the Milwaukee Auto Specialty Co., manufacturer.

The Readers' Clearing House

A Sporting Type in Figment

Horizontal Lines Secret of Speedster Body Beauty, Says Reader

EDITOR MOTOR AGE—The popularity of the sporting type of car is evidenced by the increasing number of so-called "special jobs" which are seen daily in the large cities. There has been considerable interest displayed of late in transforming many of the popular makes of touring cars into speedster or sporting types, cars which fulfill the desired effect as to individual designs and ideas. The writer, a student of chassis and body design, has attempted to show by the accompanying illustration (Fig. 2) a still new design of the strictly sporting type of motor car. This is not an ideal car, for, in fact, there is no such thing as this kind of motor vehicle, but it is original and as advanced in design as has been produced up to date. In the first place to have genuine individuality, a thing must be created not knocked down and rebuilt, and therein lies the secret of the high-grade motor car of to-day. Cars of this kind can be counted on the fingers of one hand and it is safe to say that the majority of car owners will probably never see the genuine de luxe car as the French call the high-grade, finely-finished and luxurious motor car.

Comfort Necessary

To obtain distinctive body design the chassis must be built with the body always in mind. In the accompanying illustration the chassis has been placed as near the ground as is possible under the present road conditions of the country. A roadster must be comfortable to be a success. With this in mind the body has been made as roomy and restful as possible. The deep, thick seat cushion rests flat on the floor of the body and is adjustable to the size of the occupants. There is plenty of leg room, which with the low-pitched steering column and the heavily upholstered tilted back gives the comfort of a high-grade piece of furniture. This is a feature that has never been emphasized by many manufacturers except in the customary advertising specifications. Note the low frame, hung so as to always remain horizontal with the road regardless of the load carried. Note the long flat springs, how they are hung and that the rear ones are underslung. Because of the lowness of the car the running boards have been dispensed with, which with the one-piece dust pan extending from one side of the body under the car to the other side gives the car a sporty rakish appearance, in strict harmony with the kind of body used. Note the shape and position of the one-piece fenders. The large rounded radiator is placed several inches back of the front axle and is the highest point of the body outline excepting the windshield. The hood and cowl rise gradually in a straight line to the slanting windshield which is reversible and of the ventilating rain-vision type. Note the depth of the cowl, which is finished inside with polished walnut and brass trimmings, which is also used to trim the top of the body. The frame widens slightly near the center so as to accommodate three persons comfortably in the seat. Note the straight yet boat-like lines of the body. Note the straight line extending from the radiator to the back of the body and that the decked back is slightly lower than the cowl. The rear part of the body is finished off in torpedo-boat fashion with an opening in the top of the deck for tools, batteries and spare tires, which can also be carried on the gas tank pitched forward against the back. Note the shape and position of the doors and that the handles are left exposed to break the monotony of the perfectly smooth sides.

A wide low-hung step permits easy access to the car. The wheelbase is 138 in., the tires are 34 by 4, the engine may be either of six or twelve cylinders with its own electric powerplant, tire pump and starter, the drive is worm and direct because of the low-hung chassis. There is no limit in price up to $4,500. The writer believes that with the efficient manufacturing methods now used that the above-named price should buy a luxurious high-grade motor car.

This cannot help but show that simple horizontal lines are the secret of the fast sporting luxurious type of motor car and the writer believes from what he has seen in the manufacture of motor cars that the car here illustrated could be easily built and that it is not a radical departure from the so-called sporting type of motor car.—Julian F. Brasor.

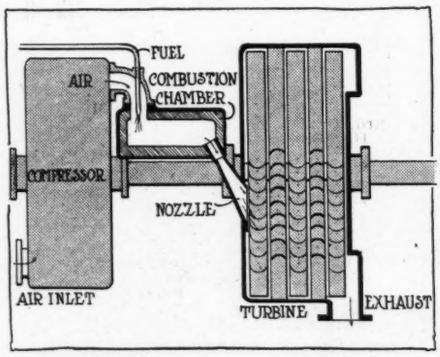


Fig. 1—Layout of simple gasoline turbine showing location of combustion chamber and nozzle lead to turbine-driving blades

FORD CYLINDER LAPPING DATA

Reader Gives His Method of Fitting Rings and Pistons

Walnut, Ill.—Editor MOTOR AGE—I note the criticism against lapping in pistons by G. E. P. in your March 22 issue, and while the criticism to some extent may be all right, there are some things he has not made very clear.

1—I would call attention to the question—How does he get all of his pistons to fit correctly? Does he expect to find all of the cylinders of an old machine the same size? A set of four pistons that could be driven by any power from the crankshaft can never be a correctly finished job.

I have had considerable experience with machines and the subject of curing oily cylinders on a Ford would probably be of great interest. I believe the easiest and surest way to stop the front, or any other, cylinder from oiling is to lap in a new oversize piston. Also if a machine has been driven a year or more there is usually more or less noise that can be entirely overcome by this process. I have always lapped in pistons without taking the engine out of the car.

In commencing this operation, of course, cylinder head, bottom plate, radiator, etc., are removed and usually I choose my pistons before I remove the old ones, noting at the same time the conditions to be rectified. An oversize piston can be easily tried while the old one is down. I find that even new oversize pistons vary a little in size. While one may fit into a cylinder easily, another of the same size will not go in at all. For a common job I like to have four of the .0025 oversize and four of the .005 oversize to choose from. I find that the top of an old cylinder is often worn a little more than the bottom, therefore a little larger. Therefore, there is need of an abrasive to even it from top to bottom. I choose a piston that will just start in the cylinder bottom side up and with a lengthened connecting rod, twist it in, first taking off the rings and putting on a little of the finest grinding compound.

Care must be taken to twist it clear through so that the bottom of the piston grinds against the bottom of the cylinder, making an even job from top to bottom. This is not as difficult as it might seem. The jobs I have done were to correct oil pumping and overcome all noise, therefore were fitted closer than for a racing job. I expect the piston to show the effect of grinding so that the original roughness is about smoothed down. It must fit close enough so that it is difficult to move dry, but will work easily if kerosene is applied. A piston can fit quite tight, yet crank easily if it fits and is smooth; yet a loose fitting piston may crank hard if rough. The trouble with a rough fit is that though it may seem tight, yet it may not fit good enough on the low spots to prevent oiling.

Now for the abrasive idea. Yes. it is serious. It sticks there. I wiped it good and dry, then washed with kerosene, next drenched it with a small syringe letting the overflow run out. After this I oiled with cylinder oil and repeated. I have opened two of these machines and found the cylinders just as smooth as glass and no sign of trouble after considerable use. It absolutely cures oil pumping.

Probably I should have mentioned the connecting-rod bearings. Note the bolt head next to the camshaft and punch mark the cap so that each rod gets back just as it came out. Then correctly fit the bearing before removing the old piston, because the new piston will show up a loose bearing in a hurry if you leave one and will be so tight that you cannot feel the bearing with it connected. I did not lap the rings, believing the cylinder walls to be in condition soon to get them in position, which has proved very satisfactory.

In starting I used 2 qt. of the best light cylinder oil above the top cock. While a little worked up, it made no trouble the first 500 miles, not even a dirty spark plug, and it was almost necessary to insure plenty of lubrication on new work.

This work correctly done gives you an engine far more powerful and silent than any new Ford engine.—W. F. Black.

WHY HIGH TEST FUEL OVERHEATS

Reader Errs in Explaining Experience on Kerosene Basis

Des Moines, Iowa—Editor MOTOR AGE—In your issue of March 22 I note your reply to inquiry of T. H. Merson with regard to the burning of a mixture of benzine and kerosene.

Relative to this, allow me to detail my experience: I was not using so high a test of fuel as benzine but was using the highest test gasoline I could get in a 1914 Mitchell big six. The mixture was approximately half and half. I had not gone a few miles when the car began to heat up rapidly and soon boiled. Every little while I had to stop and add water to make up for that boiled out through the overflow. Whenever I started after putting in fresh water, I noticed that it seemed to turn stiff, but did not investigate. Later on the engine turned harder and harder until finally when I threw out my clutch the engine stopped. I drained the oil in a bucket, took down the engine, drew out the pistons, oiled and replaced them and returned to town, stopping every little while to allow cooling.

The fact that I wish to bring out is this: In burning a mixture like the one in question with the ordinary gasoline carbureter, I used a well-known carbureter, the mixture necessarily must be so rich, to obtain enough volatile fluid to produce an explosion, that it is very hard to obtain an adjustment that is satisfactory at all speeds, in the first place.

Second, taking into consideration the above, the lower grade fuel is not properly vaporized and merely burns in a flame, producing direct heat with no power.

Third, in the time allowed for the power stroke this low grade material does not all burn and there is more or less that drags on the piston wall. This kerosene cuts the oil as fast as it is deposited there, thus increasing the friction and again producing heat.

Fourth, a percentage of this low grade fuel will pump past the rings and, entering the oil reservoir, lowers the lubricating value of the oil, thus producing more heat and less power to overcome friction.—N. E. Evans.

You give your experience with a high test fuel and draw your conclusion on the basis of a low test fuel, such as kerosene. Your reasoning concerning the action of kerosene is correct but does not fit high test gasoline or benzine. These high test fuels overheat the engine because of the very high explosive quality of the fuel.

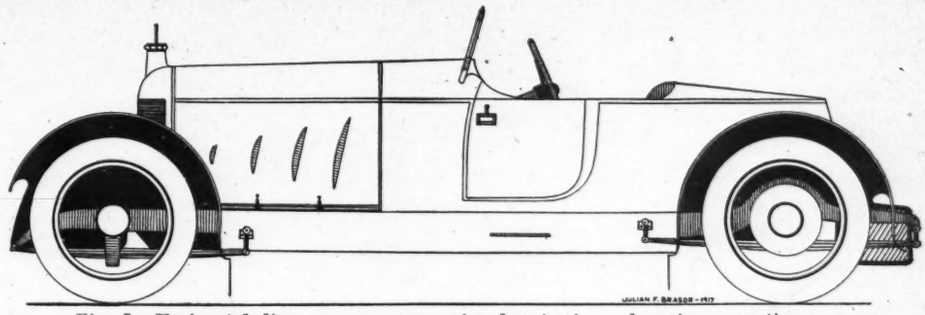


Fig. 2—Horizontal lines are necessary for beauty in a luxurious sporting car, according to a reader's idea

Inquiries Received and Communications Answered

W. F. Black	Walnut, Ill.
N. E. Evans	Des Moines, Iowa
F. E. Trisler	Harrold, Tex.
J. P. Baldwin	New Orleans, La.
H. H. Miller	Bellefontaine, Ohio
B. H. Olsen	Brookfield, Mo.
E. T. Heath	Anaconda, Mont.
M. A. Walker	Dillon, Mont.
Howard Harvey	Bethany, Neb.
T. E. Harrison	Aberdeen, S. D.
A Reader	Pleasanton, Neb.
Ralph R. Wilson	Frankfort, Ky.
E. A. Weber	Deep River, Iowa
A. M. Woodward	Janell, Tex
Donald Boston	Fort Collins, Colo.
A Reader	South Nelson, N. B.
Marshall Runge	Franksvill,e Wis.
H. L. Johnson	Bridgewater, Iowa
L. F. Snoddy	Kansas City, Mo.
A. Thomas	Portland, Ore.
G. E. Plumstead	Buffalo, N. Y.
F. T. Sargent	Belvidere, Ill.
J. E. Pierce	West Allis, Wis.
L. C. Vandoozer	Winfield, Kan.
W. R. Brown	Donner, La.
C. W. Mathiviet	Cleveland, Ohio

EXPLANATION OF GAS TURBINE

Layout of Simple Type Illustrated and Described

Harrold, Tex.—Editor MOTOR AGE—Explain the gasoline turbine.—F. E. Trisler.

A layout of one type of gasoline turbine is shown in Fig. 1. The entire powerplant consists of a rotary air compressor, combustion chamber, fuel inlet and a casing within which are turbine blades.

Air is forced under pressure from the air compressor into the explosion chamber furnishing oxygen for burning the gasoline which enters through the small fuel pipe. The burning gases expand through the nozzle shown in the sketch and enter the turbine blades at a correct angle to drive them forward without power loss. These turbine blades might be compared to a paddle wheel of a boat except that they are driven instead of driving members. In the process of expansion the gases pass from the first moving turbine wheel through a stationary wheel into another moving wheel through another stationary wheel and then into another moving wheel from whence they are exhausted through the opening shown in the illustration. It is virtually a triple-expanding engine with the stationary blade holders serving as valves. Of course the moving turbine wheels are the driving members of the turbine.

Moth Balls in Gasoline

New Orleans, La.—Editor MOTOR AGE—I am told that if I were to put one camphor ball, the ordinary moth ball, to each gallon of gasoline, that I would get more mileage and less carbon. Is this a fact?

2—Would the life of tires be shortened, and would I get less mileage from same, if I were to buy them 2 months before using them?—J. P. Baldwin.

1—Moth balls are often used in gasoline with a view to increasing the mileage, but there have been no official tests to show that there is a marked effect. It is unlikely that one moth ball in a gallon of gasoline would have much effect.

2—It depends entirely on what care you took of the tires. If they were kept in a cool, dark place, wrapped in cloth or paper, they would be as good as new when you wanted to use them. If they were left

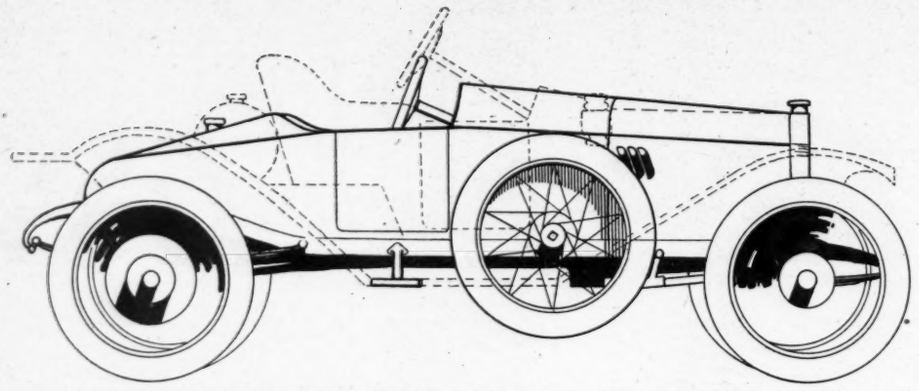


Fig. 3—Simple and inexpensive body design for application to 1912 Buick model 28 roadster

where sunlight or heat could get at them the rubber would lose some of its wearing ability even in that short time.

1912 BUICK MADE INTO SPEEDSTER

Sketch Given of Simple and Inexpensive Body Design

Bellefontaine, Ohio.—Editor MOTOR AGE—I have a 1912 model 28 Buick roadster car which has been run 15,000 miles. The engine is in good condition and nearly as quiet and smooth as it ever was. I would like suggestions for changing it into a speedster; also a sketch. —H. H. Miller.

In Fig. 3 is a sketch showing a speedster body with modern lines as it might appear on a Buick model 28. Inasmuch as this is an old car and for that reason would not merit an expensive body the design has been made with simplicity and economy in view. There are straight sides conforming with the frame to the rear of the car and there the end of the body rounds over in a simple sweep. The same gasoline tank is used and buried under a sloping rear deck. The same seats could be built into the body or bucket seats could be fitted. The cowl piece makes a simple sweep from the straight sides of the body in a gradual curve and this conforms with the lines of the new hood. Wire wheels with a spare carried on the side are shown. Although this would give a classy appearance it is doubtful whether the expense would be advisable. One should be able to build such a body for $200.

INFORMATION ON MODEL 30 BUICK

Size of Piston Rings and Data On Lubrication

Brookfield, Mo.—Editor MOTOR AGE—I have a Buick Model 30 and want your advice relative to the following:

1—What is the size of the piston rings?

2—How can one ascertain if there is sufficient lubricating oil in crank case on this model?

3—What form of lubricant is recommended for the differential, transmission gears and timer gears? What is the proper level at which lubricant should be kept in above places?

4—How often should the engine be taken down and overhauled, even though it runs smoothly?—B. H. Olsen.

1—The piston rings used on the model 30 are 4¼ in. in diameter and $\frac{1}{16}$ in. wide.

2—Engine oil is introduced into the front breather tube and is carried in a reservoir on the side of the crankcase from whence it is drawn by the oil pump and delivered to the engine in small quantities. The oil can be seen flowing through the sight feed on the dash as it is used. If the pump is properly adjusted it will just maintain the level of oil in the splash troughs in the crankcase, and the correctness of this level can be determined by removing the plugs from the side of the case which are for that purpose.

3—The differential should run in heavy steam cylinder oil and the case should be filled to the level of the filler opening. The timing gears are automatically lubricated by engine oil from the crankcase and require no separate attention.

4—There is no reason why the engine should be taken down and overhauled as long as it operates in a satisfactory manner. If bearings become loose and the engine becomes noisy in a manner that cannot be quieted by adjustment, then the engine should be overhauled. But if everything runs well leave well enough alone.

IN WRITING AN INQUIRY TO THE READERS' CLEARING HOUSE DEPARTMENT DESCRIBE THINGS COMPLETELY!

If your car is giving trouble, tell us all about the trouble and what you have done to try to remedy it. Always bear in mind that we are looking at your car when we are reading your inquiry. Try to picture everything to us as we might see it if we were looking at your car.

Do not write in and say, "My engine has developed a serious knock. What is the trouble and how can I remedy it?" It is as impossible to give an intelligent answer to such a question as it is to answer the question, "Why is a mouse?" Tell us where the knock is, what it sounds like, what effect it has on the operation of the engine, under what driving condition it is most evident, etc.

Do not ask us questions concerning motorcycles and motor boats. Our field does not cover these industries. Do not ask us for working drawings of engines, gearsets, etc. We endeavor to conduct an information department, but not an engineering department of such a nature. We cannot design the mechanical units of a car for you. This also applies to specifications for speedster bodies to be applied to touring or roadster equipped chassis. We will gladly give a general plan of a body, showing how it might appear when complete, but we cannot furnish complete patterns and working drawings for the construction of these bodies.

GAS LINE COILED ABOUT EXHAUST

Better to Heat Air—Gasoline Might Reach Boiling Point

Anaconda, Mont.—Editor MOTOR AGE—Would a heated gasoline feed line be of help in getting more mileage out of a gallon?

My idea has been to take the gasoline feed line and coil it twelve or fifteen times around the exhaust pipe, but keep it away from that pipe about ¼ or ½ in. by setting in four or six strips of some hard asbestos and then inclosing the whole coil in a round sheet-iron housing so as to hold the heat. Would this arrangement be dangerous by the gas becoming too hot?

2—I have just overhauled my 1912 Cadillac. The exhaust and intake manifolds are on the same side. Would it improve the running and power if the two manifolds were roped together with asbestos sheeting and held with copper bands? No matter how long the engine runs the intake manifold is always cold from the carbureter to the cylinders. My idea is to heat the intake with the exhaust. What is your opinion on this?—E. T. Heath.

1—Heated gasoline will vaporize more readily than cold gasoline. However, this method you suggest would have to be handled with care inasmuch as a little too much heat would boil the gasoline with the result that the mixture would be affected and the engine would not fire properly. The writer has seen examples where the vacuum-tank pipe was located so near the cylinder block that the heat of the engine boiled the gasoline with the result that the engine would miss and lose power. The danger of fire would exist no matter how carefully you wrapped the piping. It is better to heat the air.

2—This idea is a good one. You should secure better carburetion by such means.

Hupp Compression Increase

Frankfort, Ky.—Editor MOTOR AGE—Is it possible to increase the compression of a Hupmobile?

2—Can this be done by increasing the length of the connecting rods; if so, how much? Or would it be best to put plates on the piston: if so, how thick should these plates be?—Ralph R. Wilson.

1—It is possible to increase the compression. It might be that this old engine has lost its original compression and that to bring it back to normal or even above normal would increase the power.

2—It is not recommended that longer connecting rods be used or plates put on the piston. In fact, the only step advisable would be to install non-leaking rings or, if the pistons are loose, a new set of pistons about .015 in. oversize.

Effect of Carbon Deposit

Dillon, Mont.—Editor MOTOR AGE—Why will carbon in the cylinders diminish power, or interfere in other ways with the proper action of the engine; more than decreasing the capacity of the cylinders to the extent of the deposit; provided, of course, that valves are kept properly ground, and that there is never any preignition due to incandescent particles of carbon?—M. A. Walker.

In the first place there cannot exist within an engine any perceptible amount of

carbon without the possibility of pre-ignition caused from incandescent carbon particles. Eliminating this factor, however, to answer your question the carbon will work itself under the piston rings and either cause them to stick and exert undue friction against the cylinder walls or to allow compression to leak through. The factor of carbon reducing the combustion space is of little consequence in the performance of the engine.

TRANSFORMING A 1916 MAXWELL

If Pistons Are of Different Weight Machine Skirt

Bethany, Neb.—Editor MOTOR AGE—Give me a sketch transforming a 1916 Maxwell roadster into a sporty raceabout.

2—In weighing and balancing up the pistons connecting rods and wrist pins, if they vary in weight, what is the proper method in reducing the weight of the heavy ones. In other words, where should the piston be drilled to reduce the weight? What method is used to balance the crankshaft not counter-balanced? —Howard Harvey.

1—The sketch is shown in Fig. 6.

2—The weight of the heavy ones should be reduced by machining rather than by drilling. Surely the weight cannot be over a fraction of an ounce if the pistons are of the same design, and this small excess may be removed from the inside of the piston skirt. It is suggested that you micrometer the thickness of the skirt on the light pistons and then on the heavy pistons. You can then determine whether there is enough extra metal to permit removal of enough of the stock to equalize the weights. Putting the crankshaft in a running balance means that the ends of the crankshaft can be suspended on very nearly frictionless surfaces, placed in any degree of rotation and will remain in that position. A method of doing this is to support the crankshaft in roller or ball bearings or by some other method that allows minimum friction and to rotate it. If one side drops to the bottom by gravity, then metal is removed from the checks on that side until it will balance with the other. This process is continued until the crankshaft will remain stationary at any place it may be set in its rotation.

No Magneto on Glide

Deep River, Iowa—Editor MOTOR AGE—Is there any way to put a Bosch magneto on 9 Model "30" 1915 Glide without taking off the generator?—E. A. Weber.

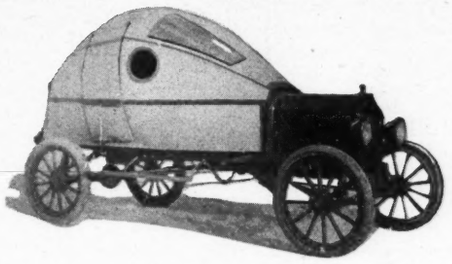


Fig. 4—The "Bug," a canvas inclosed car with folding seats to afford sleeping quarters

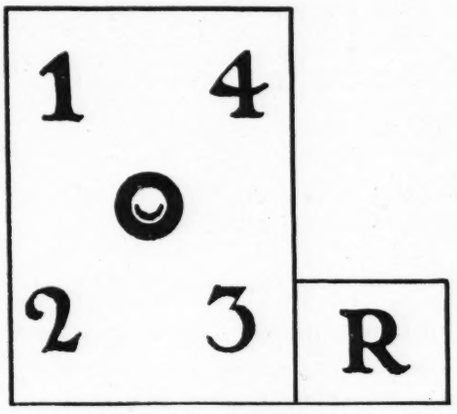


Fig. 5—Diagram of gearshift arrangement used on the new White cars. One has to lift a latch to reach reverse gear

We cannot see any way that a magneto can be put on unless the generator is taken off. The generator installed on this motor takes up a good deal of room on the side of the motor, leaving less than 6 in. between the rear of the generator and the rear motor leg and as the generator does not have an extended shaft at the rear, there would be no way of attaching the magneto.

THE "BUG" CANVAS INCLOSED CAR

Seats May Be Folding Beds to Afford Sleeping Quarters

Aberdeen, S. D.—Below are details of construction of the Bug, built by T. E. Harrison and N. A. Goodvin of this city, shown in Fig. 4.

The body is mounted on a Ford chassis with the steering gear lowered. A boat-shaped platform, about 9 ft. long and 4 ft. wide at its widest part, was used as the floor. Four strap-iron bows were bolted to the floor, the front one bent the shape of the dash, the others round.

Strips of basswood 2¼ by ¼ were fastened with stove bolts to the bows lengthwise of the body. Galvanized iron 18 in. wide was used around the bottom. Above was bolted flexible board and to this was glued heavy canvas. A narrow molding covers the line where the canvas meets the sheet iron. There are two long windows in front and one round one on each side.

The interior was lined with heavy blue buggy upholstery. Tilting cushions were made to conform to the inside lines of the body. The back of the front seat is divided and mounted on hinges so that they can be dropped level with the cushions. The rear back also can be lowered. With the use of robes this arrangement furnishes a very comfortable bed while on hunting trips and the like. The door is on the right side and hung from the top.

The gas tank was placed on the left running board and a Stewart vacuum tank applied to the left side of the engine. A Brickley heater, which is a local product, was installed. A mirror in front of the left window furnishes a rear view. All fenders were taken off. The cost of material was about $20 and all work was done outside of working hours.—T. E. Harrison.

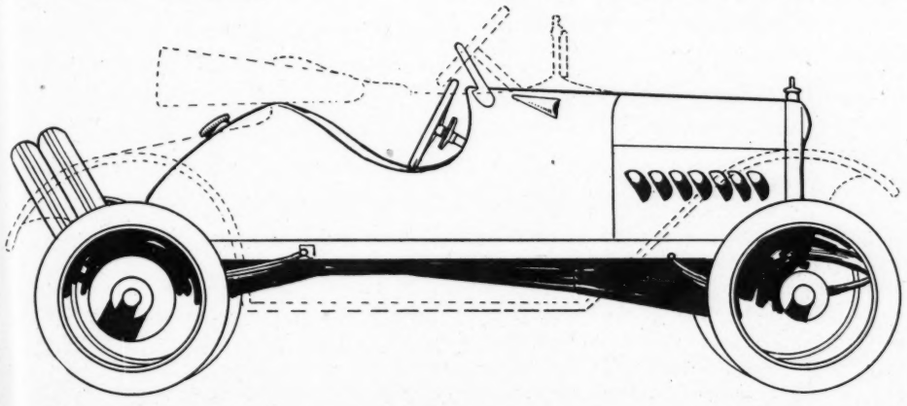


Fig. 6—Body design for transforming 1916 Maxwell model 25 into a rakish sporting type

READER'S IDEAS REBUILT FORD

Would Run Exhaust Manifold Through Hood or to Muffler.

Pleasanton, Neb.—Editor MOTOR AGE—Would like to state my idea of an ideal rebuilt Ford. In rebuilding the car it should be kept as light as possible and also practical and economical. It should be underslung on the original springs by putting the front and rear axles ahead of their respective springs; have wire wheels, and the body be streamline without an offset from the radiator back. The rear axle gear ratio should not be changed so the car can take hills in rough hilly country on high, also to keep within city speed limits on high. Pistons and connecting rods should be as light as possible with non-leaking rings, but would not rebore the cylinders as there is not much to gain and the engine should be kept economical. Is it practical to enlarge the valves and ports? I would run the exhaust manifold directly through the hood but just before each lead goes through, I would have a lead going to a muffler and have a valve at each intersection, the four to be operated in a unit as one. I would also change the carbureter. cooling, ignition and oiling systems and would like the car to show a speed of 70 m.p.h. on a suitable track. It should also have small fenders. Please criticize my idea if it is not practical.—A Reader.

Your idea follows the plans of rebuilt Fords which MOTOR AGE readers have submitted. Many of them have found it valuable to enlarge the valves as well as

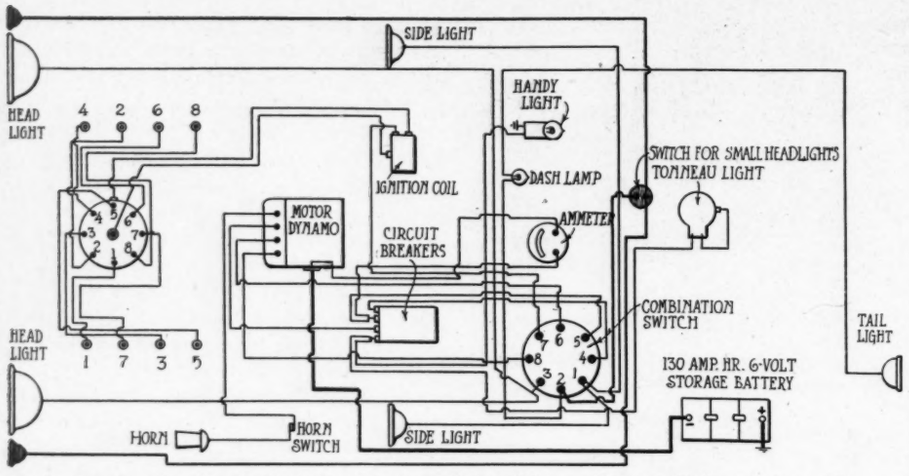


Fig. 7—Showing method of wiring auxiliary lights under headlights of type 53 Cadillac. The wiring includes a switch which will permit auxiliary lights to burn with side and tail lights or for side and tail lights to burn alone

rebore the cylinders. We see no reason for a body so narrow that there is no flare fram the radiator back. At best this would not seat over one person and if the body were flared enough to allow seats for two there would not be enough added wind resistance to make an appreciable difference in the speed of the car.

Saxon Valve Springs

Janell, Texas.—Editor MOTOR AGE—I have a Saxon four roadster and would like to have your advice as to using heavier valve springs so as to get the valves to close quicker.—A. M. Woodward.

A cheaper method would be to insert washers under the valve springs, thus shortening their action. This would have practically the same effect as installing heavier springs.

White Gearshift Positions

Fort Collins, Col.—Editor MOTOR AGE—Illustrate by diagram the gearshift positions of the White cars now on the market.

2—Also show a diagram of the generator circuit of the 1915 Maxwell 25 using Simms-Huff. —Donald Boston.

1—The diagram is shown in Fig. 5.

2—The diagram is shown in Fig. 9.

AUXILIARY LIGHTS ON CADILLAC

Wiring Diagram Showing How to Connect Additional System

South Nelson, N. B.—Editor MOTOR AGE—I want to put a pair of auxiliary headlights under the headlights of my type 53 Cadillac Eight. I want these lights controlled by the regular switch that controls the side and tail lights, so that when they are burning, the side and tail lights will also be burning. I will have a switch on the wire to these auxiliary lights, so that when the car is standing the side and tail lights only will burn.

Give diagram showing how to wire these lights from the present Delco switch without changing the present wiring.

Also advise proper size wire to use.—J. L. O'Brien.

The complete wiring of the Delco system on this car is shown in Fig. 7, and in heavy lines on this diagram is shown a wiring layout to conform with your ideas. A wire connected with the tail light wire post on the switch goes to the additional switch which you specify. From here wires are conducted to the two lights under the headlights. With the additional switch turned on the added lights will burn in conjunction with the side and tail lights, whereas the side and tail lights will burn alone when this switch is turned off.

Use the same wire as is used for wiring the side lights and tail light.

DEFINITIONS OF COMMON TERMS

Formula Horsepower, Hotchkiss Drive, Bendix Drive, Etc.

Brownsville, Tex.—Editor MOTOR AGE—Give brief definitions of the following terms:

1—N. A. C. C., A. L. A. M., and S. A. E. horsepower ratings.
2—Hotchkiss drive.
3—Bendix drive.
4—Thermal efficiency.
5—Volumetric efficiency.
6—Helical gears.

It is not necessary to give illustrations to describe these. I only want a sentence or two on each one so that I will have some idea what a man is talking about when he uses the above terms.—H. C. Gorman.

1—The three ratings are identical. The American League of Automobile Manufacturers, A. L. A. M., was reorganized under the name National Automobile Chamber of Commerce, N. A. C. C.; therefore the first term is obsolete. The Society of Automobile Engineers, S. A. E., uses the N. A. C. C. rating which is bore times bore times number of cylinders divided by 2.5. N. A. C. C. is the correct term to apply to this formula rating.

2—When brakes or power are applied to the rear axle there is a tendency for the axle to continue its course straight ahead or lag behind, and also to twist. The Hotchkiss principle means that this effort on the part of the axle is checked by the main leaves of the rear springs which have a rigid anchor to the frame. Radius rods or torsion tubes for absorbing the forces are thus eliminated.

3—The Bendix starter pinion is a device attached to the starting motor in which is a spur gear to engage with the gear on the engine, and within this spur gear is a worm gear. When current is applied to the starting motor centrifugal force throws the spur gear out on the worm and thus engages it with the engine gear. When current is shut off the worm gear winds the spur back out of the engine gear.

4—Thermal efficiency means the proportion of heat units contained within the fuel which is utilized for power. An engine with high thermal efficiency therefore transforms a high percentage of the heat units in the fuel to power. Heat is power in an internal combustion engine and the less heat lost the greater is the power.

5—Volumetric efficiency applies to the ability of the engine to fill the cylinders with fresh gas and exhaust the burned gas out of them. The more nearly the cylinders are completely filled with fresh gas and completely exhausted of burned gas the higher is the volumetric efficiency.

6—Helical gears are gears which have their teeth cut at an angle. In a plain spur gear the teeth are cut straight across the periphery of the gear. When helically cut the teeth are at an angle across the periphery, but this should not be confused with spiral gears, which are also cut at an angle but with a spiral cut instead of a straight cut as is the case with helical gears. The design is to give quiet action to the gears.

What Not to Ask

Where manufacturers have made official speed records under the sanction of the American Automobile Association, we will gladly print the speed figures made during that test. Where no tests have been made there is no source of positive information regarding these car speeds and we see no reason why we should guess at it.

Furthermore, the idea of anybody estimating within 5 or 10 m.p.h. how much faster a car will go with aluminum pistons, higher gearing, etc., etc., is absurd. A poor mechanic may install new parts intended to increase the speed and do such a sloppy job of it that the speed will, in reality, be reduced.

The same thing applies to the maximum revolutions per minute of an engine. Two engines of exactly the same model may have a difference in maximum speed of 200 r.p.m. Furthermore, when the engines become used, the maximum changes. It depends to such a great extent on the adjustment and general condition of the engine that no reasonably accurate figure can be given. Another thing we cannot give you with any accuracy. That is car weights.

LIGHTS DIM WITH ENGINE IDLE

Indication that Trouble Is in Battery, Not Generator

Franksville, Wis.—Editor MOTOR AGE—Give diagram of Maxwell 25 Model 1915 electric lighting system. On this Maxwell the lights are very dim when car is not running. I have a 36 c.p. 6-volt bulb in the headlights, and when engine speeds up I get full candlepower, if not more.

2—What is the cause of oil getting up in the first cylinder of a Ford engine. Cylinder wall is O. K., piston is O. K., also rings.

3—Is it best to use heavy or light oil in engine?—Marshall Runge.

1—The wiring diagram is shown in Fig. 7. If the lights are low when the car is not running and brighten up a great deal when the generator cuts in it is an indication that the battery is not properly charged. It should be examined for defective cells or plates. When the generator

starts delivering current, this current passes through the battery and makes the lights bright.

2—If there is excessive oil pumping in the front cylinder there is something wrong in the fit of the pistons or rings. In theory this cylinder will receive more oil than the other three inasmuch as it keeps cooler, getting the water and air first, and because of its coolness the piston is not expanded as much as in the other cylinder, therefore allows more space for oil to get through. In practice, however, the effect would not cause an appreciable amount of oil pumping.

3—In moderate or summer weather a medium grade of oil should be used. In winter a light grade is advisable.

Taking Up Steering Play

Buffalo, N. Y.—Editor MOTOR AGE—Advise how to take up play in the steering apparatus of a 1912 Stoddard-Dayton Savoy roadster.—G. D. Plumstead.

The lost motion is controlled by adjustment of the bushing which is placed on top of the steering gear housing and through which the steering post extends. Further adjustment can be made by loosening the set screw and moving the eccentric bushing through which the jaw shaft passes. This will bring the worm and sector closer together, eliminating all lost motion.

The ball and socket joints in the steering connections may be the source of some of the play. There are adjusting bolts within these joints.

Ether in Gasoline

Donner, La.—Editor MOTOR AGE—Would you advise the use of ether mixed with gasoline, and if so, what percentage for pleasure cars? 2—Will its use harm the engine?—W. R. Brown.

1—As an economy measure it is out of the question. As a means of securing a slight increase in power and speed it is useful. Its use is forbidden in sanctioned racing. If you want to go to an exorbitant expense to gain slightly more power you might mix an ounce with a gallon of gasoline. More than that or even that much may cause your engine to overheat.

2—If too much is used overheating will result.

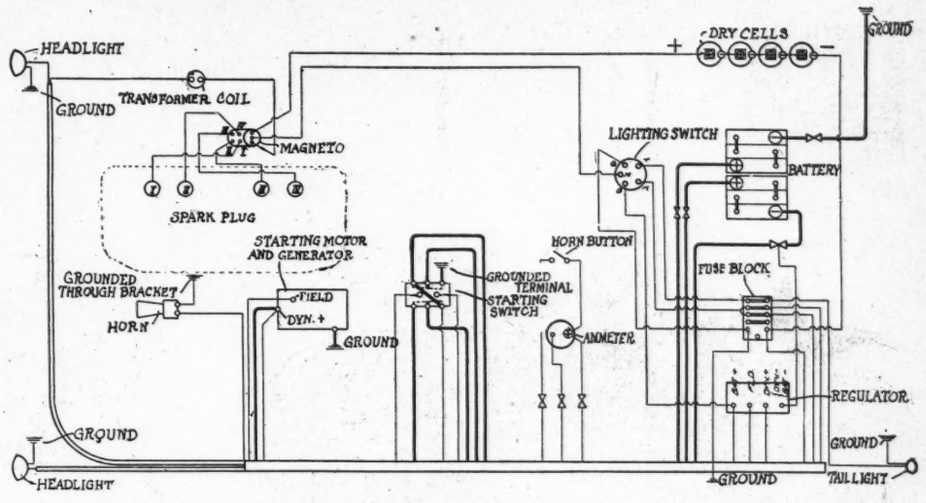


Fig. 9—The Simms-Huff starting, lighting anignition system as applied in the 1915 Maxwell model 25

Marmon 41 Wiring

West Allis, Wis.—Editor MOTOR AGE—Publish wiring diagram of the 1915 Marmon speedster Model 41.—J. E. Pierce.

Illustrated in Fig. 8.

Enlarging Trumbull Valves

Portland, Ore.—Editor MOTOR AGE—Would enlarging the valves of a four-cylinder Trumbull cyclecar increase the power, and how much could they be enlarged? It is a 2⅞ bore and will do 45 m.p.h., but does not seem to make hills on high very well. I have four non-leak rings in it.

2—Is taking vapor off the water tank into the intake manifold a good idea?—A. Thomas.

1—Enlarging the valves would increase the power. They could be increased $\frac{1}{16}$ in. on a side or a total of ⅛ in. diameter without weakening the walls.

2—Yes.

Help for V. C. Williams

Belvidere, Ill.—Editor MOTOR AGE—I noticed an inquiry in the March 22 issue by V. C. Williams of Ripley, Ohio, and am sending suggestion in answer.

I have driven a 1914 Hudson six-40 three seasons. The first season I had much the same trouble as Williams. This was caused by a tight tappet, thus a loss of compression.

Would suggest that Williams look his valves over and see that the tappet clearance is .003 in. or a trifle more—by no means less, as the heat of the engine expands the metal. Also see that the valve stems are not gummed so as to stick.—F. T. Sergent.

Not Too Much Air

Winfield, Kan.—Editor MOTOR AGE—I notice that all late models of cars are making an effort to get more hot air through the air intake of the carbureter. Is it possible to get the air too hot, so that it interferes with the engine working at its maximum power, provided there is always an ample supply of fresh, cool air admitted to the heater?—L. C. Vandoozer.

In drawing the hot air from the engine itself, either from a stove on the muffler or through indirect heat by water jacketing, there is no chance of getting too much hot air.

Lean Mixture Causes Backfire

Kansas City, Mo.—Editor MOTOR AGE—What causes an engine to backfire on too lean a mixture?—L. F. Snoddy.

This is caused by loading. Too lean a mixture means that the engine does not fire every revolution with the result that unburned gases are in the cylinders and manifolds. When enough gas gets in to cause an explosion this extra supply of unburned gas is ignited with backfiring as the result.

Defines Orphan Car

Cleveland, Ohio.—Editor MOTOR AGE—Referring to page 45 of March 15 issue to question, "What is meant by an orphan car?" Motor Age answered, "A car no longer being manufactured." This would class a good many cars as orphan cars.

Reader's Def.: A car whose original manufacturers are not in a position to furnish repair parts for same.—C. W. Mathivet.

An orphan car is one which is no longer manufactured and whose manufacturer is no longer in business. It is a car without a mother factory which is still alive. Your definition is correct.

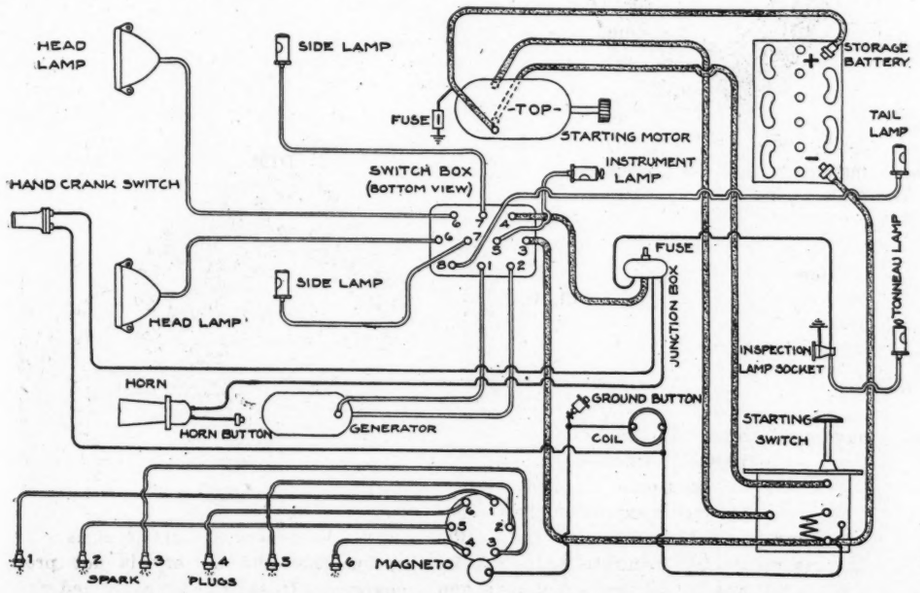
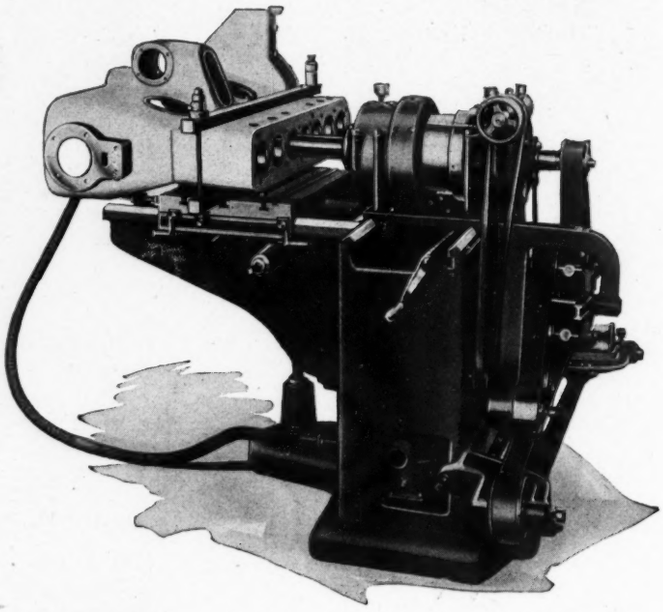


Fig. 8—Diagram of the wiring system used on the Marmon model 41

The Accessory Corner

Knickerbocker tractor attachment for use on Fords. The Ford axle is used as a jackshaft to carry the spur driving gear At the right the Olsen cylinder-grinding machine for all sizes of cylinders



Gray & Davis Spot Light

PIERCING illumination is the distinguishing feature of the Long Distance spot light which is now being put on the market by Gray & Davis, Inc., Boston. The beam of light is maintained by an accessible adjustment and the switch is located in the stationary part of the bracket. Another feature which is claimed to be peculiar to the Gray & Davis construction is the smooth turning Stay-Put joint which is also appreciated during the day time use of the mirror attached to the case of the lamp as shown in the illustration. This also gives an idea of the neat mounting, the wires being carried down through the bracket attachment, thus eliminating any swinging wire. The lamp is designed to blend with the lines which are characteristic of modern body construction and can be readily attached to any windshield. The lamp is finished in black with a nickel door and the reflector is a true parabola, plated with silver of the highest U. S. government assay. The lamps are made to be water and dust proof. Nitrogen bulbs are furnished and the diminishing type of mirror is used. The diameter of the door is 6¾ in. The spot light, which has the model name E-30, sells for $7.50.

Burn-Oil Device for Fords

A kerosene attachment for the Ford car is known as the Burn-Oil. It is claimed that the device will handle pure kerosene efficiently. As will be seen by the illustration it is an atomizing device taking the place of the manifold and its purpose is to so heat the kerosene that it will vaporize efficiently. The complete device costs $30. The Burn-Oil Device Co., Peoria, Ill.

Cylinder Grinding Machine

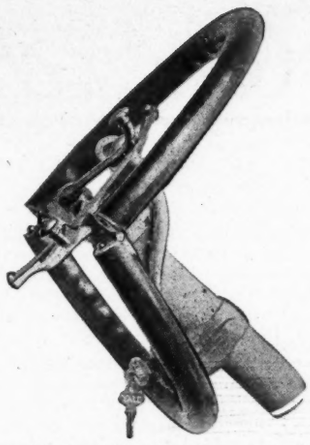
The Olsen cylinder-grinding machine is designed for use in motor car manufacturing plants or large repair shops. Three basic patents cover the particular features of the machine. One novel feature of the machine is the automatic belt-tightening device which keeps an even tension on the belt regardless of the position of the head on the bed. Another feature is that after the cylinder is once set it is only necessary to shift the grinding head in order to bring the succeeding holes in position for grinding. The table has only a forward and backward motion. This takes care of the feeds and gives a rigid construction to the table. An adjustable-feed tripping device is provided and after it is once set the feeds are automatically tripped at each end of the travel. The head containing the grinding spindle is adjustable to a double-eccentric motion which enables the grinding wheel to move from absolute center to the maximum capacity of the grinding diameter. The grinding head has a fine micrometer adjustment to facilitate grinding to exact size. The machine will handle any cylinder up to 8 in. diameter. E. A. Fuller Sales Co., Madison, Wis.

Beckley-Ralston piston bushing remover for Fords and the Perfection rim tool

Folding Steering Lock

A steering wheel lock and folding wheel combined is found in the Foldlock. By pressure of a button the steering wheel is caused to split in the middle and drop down against an attachment on the steering column. Here a locking device on the steering wheel half matches with a locking device in the attachment on the steering column and a Yale lock fastens the wheel against the post, making it impossible to drive the car and at the same time getting the wheel out of the way to permit easy access to the driver's seat. It does not in

The new Gray & Davis spotlight with Stay-Put joint



A combination steering lock and tilting wheel, the Foldlock

any way interfere with the steering apparatus and can be installed on any make of machine. Carl L. Winberg, 1105 Mallers Bldg., Chicago.

Perfection Rim Tool

The perfection rim tool is a light-weight lever device for quick removal or applica- and put the car out of commission. The price is $5. Wallace C. Hood Service Bureau, Detroit.

Engine Limbering Stand

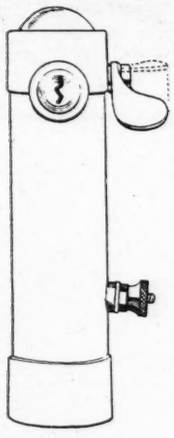
This engine limbering stand is designed for running in and testing gasoline engines. It is made to provide a simple and efficient testing apparatus in which engines can be placed and run in the same way they would be run in the car except that they are driven, instead of driving. A belt from lineshafting drives the engine through the gearset, affording means of testing this part of the equipment also. It is the invention of Hubb Diggs of the Hubb Diggs Co., Fort Worth, Tex.

W. & C. Shock Absorbers

The W. & C. double-arm shock absorbers for use on Ford cars are designed to withstand severe use and at the same time impart unusual flexibility and shock-absorbing action to the spring layout. They are built in the form of levers fastened to the axle and to the spring ends with the ends of the levers carried on springs which fasten to the car frame. Thus the spring ends are supported in the fulcrum of this lever action and all slight vibration or heavy jars receive an equalizing effect by the expansion and contraction of the coil springs. The levers are malleable-iron castings fitted with bushings, steel bolts and hard oilers. The springs are double to stop the triangular pull which wears the bearings and to prevent sidesway. The price per set of four is $10. Philip H. Webber & Co., Hoopeston, Ill.

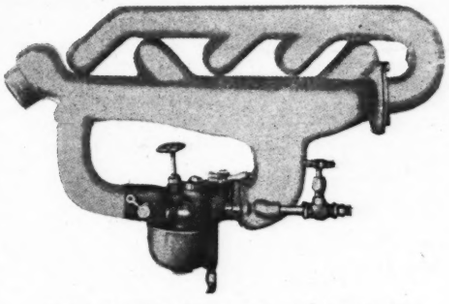
Detroit Cartridge Lock for Fords

The Detroit cartridge lock for use on Fords is a magneto circuit breaker inclosed in a case-hardened steel tube which covers the magneto connecting plug and extends up above the floor line. Pushing the foot lever of the device automatically shuts off the engine and stops the car. A serial key



Detroit cartridge lock for connection to the magneto plug of the Ford. Its use eliminates the need of the regular ignition switch key

is used to unlock the car. The regular coil switch key is no longer required to stop or start the engine. When locked it is impossible to make a new connection with the magneto, nor can the locking device be



The Burn-Oil device for use on Fords. It is claimed that kerosene can be handled sucessfully

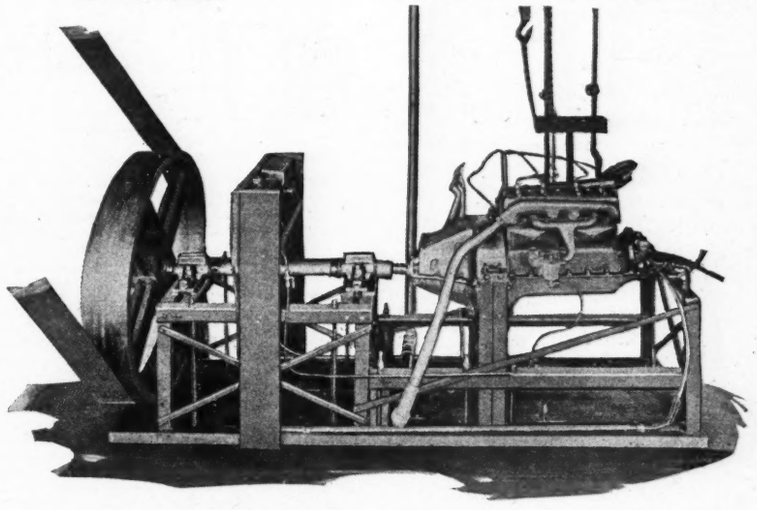
successfully tampered with, so it is claimed. To force the device from its base would destroy or damage the magneto connections The list price each is 80 cents. The Beckley-Ralston Co., Chicago.

Piston-Bushing Tool for Fords

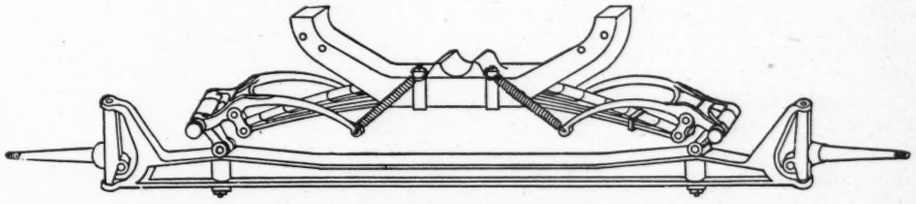
This piston-bushing remover is designed to remove with ease the worn bushing from a Ford piston. It is a one-piece tool and made of high-grade material. One end of the tool is slotted and expanded so that the tool slips through the bushing and expands over the inner end, thus making it a simple process to remove the bushing by tapping at the other end of the tool with a hammer. tion of demountable rims to tire casings. For contraction one places the two lug hooks on the end of the bars over the edge of the rim about 4 in. from the rim lock and then brings the handle bar over until it connects with the rim. A movement of the lever contracts the rim. For expansion one lets the lug hooks ride the rim in its center and then pushes the handle bar in the opposite direction, as shown in the illustration, until it locks. There are thumb screws provided to adjust the tool to any size rim. The price is $2.50. The A. & A. Co., Minneapolis, Minn.

Knickerbocker Form-a-Tractor

A tractor attachment for Fords is a product of the Knickerbocker Motors, Inc., New York. It is for farm, road and trailer use and sells for $178 complete. It is composed of a subframe unit which fastens onto the Ford frame. The Ford axle is used as a jackshaft for propelling a spur gear which engages with a bull gear in the tractor wheel on each side. The attachment can be readily used and the car again assembled into a passenger vehicle.



Engine stand for running in or testing any size of powerplant



The W. & C. shock absorber as applied to the rear axle of a Ford car. The double coil springs prevent sidesway and unnecessary wear on the bearings

From the Four Winds

SPRING HAS COME TO THIS DEALER—It is spring in California and with the milliners and other outfitters seeking by their novel displays to attract interest in their wares, the Los Angeles branch of the Studebaker corporation has been calling attention to the opening of the outdoor season. The same week that downtown merchants put on their semi-annual fashion show and three baseball teams were taking advantage of the warming sun, this firm staged an outdoor demonstration on the floor of the salesroom

What Are Most Roads Made Of?—About 2,400,000 of the 2,500,000 miles of public roads in the United States are of earth, sand-clay or gravel, according to recent statistics issued by the Department of Agriculture.

K. C. Tractor Dealers Prepare—The tractor dealers in Kansas City, Mo., through the tractor club, are planning to prepare an outline of the means of getting tractors to farms to expedite and increase the production of foodstuffs.

Effect of Cross-Canada Highway—The proposed Windsor-to-Montreal highway provided for in the bill introduced at the Ontario legislature will pass through the most densely populated sections of Ontario, serving 1,262,000 persons, or 52 per cent of the population. The areas served will represent in assessment $1,134,000,000, or 50 per cent of the total provincial assessment.

Road Injures Traction Co.—The extensive use of motor cars in California has affected the earnings of the Central California Traction Co. so much that the holders of its bonds have been asked to reduce the interest rate for 3 years. The cause of the financial plight of the company is said to be the construction of the state highway between Stockton and Sacramento, the general utilization of motor cars by farmers for travel and the use of motor trucks for freight transportation.

The Prospects for Camping Motorists—With the surveying crew assembled and ready to penetrate the Cleveland National forest in San Diego county, Cal., the Federal forest service is about to undertake one of the largest and most important recreation projects in its history. The highest peak of the Laguna mountains will be utilized as a recreation camp. Incorporated in the plans are the construction of a highway from Imperial valley points at a cost of $25,000, the subdivision of a large area for private special-permit users, the installation of a $5,000 water system, the building of a complete resort and the improvement of all surroundings in the interest of campers and visitors. The camp sites, which probably will be rented by the government for as low as $10 a year, will be scattered along the hillsides and banks of streams to a height of 6200 ft. above sea level.

Coming Motor Events

CONTESTS
—1917—

May	10	Uniontown, Pa., speedway.
May	19	New York, speedway.
May	30	Walla Walla, Wash., track.
May	30	Uniontown, Pa., speedway.
June	9	Chicago, speedway.
June	16	Kansas City, Mo., speedway.
June	23	Cincinnati, Ohio, speedway.
July	4	Visalia, Cal., road race.
July	4	Spokane, Wash., track.
July	4	Benton Harbor, Mich., track.
July	4	Uniontown, Pa., speedway.
July	4	Tacoma, Wash., speedway.
*July	4	Omaha, Neb., speedway.
July	15	Missoula, Mont., track.
July	17-19	Intercity Reliability.
July	22	Anaconda, Mont., track.
July	29	Great Falls, Mont., track.
Aug.	4	Kansas City, Mo., speedway.
Aug.	5	Billings, Mont., track.
*Sept.	3	Cincinnati, Ohio, speedway.
Sept.	6	Red Bank, N. J., track.
Sept.	8	Pike's Peak, Colo., hill climb.
*Sept.	15	Providence, R. I., speedway.
Sept.	22	Allentown, Pa., track.
Sept.	28	Trenton, N. J., track.
*Sept.	29	New York, speedway.
Sept.	30	Uniontown, Pa., speedway.
Oct.	6	Kansas City, Mo., speedway.
Oct.	6	Uniontown, Pa., speedway.
Oct.	6	Danbury, Conn., track.
*Oct.	13	Chicago, speedway.
Oct.	13	Richmond, Va., track.
Oct.	27	New York, speedway.

* A. A. A. Championship Award Event.

SHOWS

April 11-14—Calumet, Mich.
April 20-26—Milwaukee, Wis.

Employes Have Small Clubs—The B. F. Goodrich Co. employes, Akron, Ohio, are starting the experiment of getting small clubs for single men and the Chelsea club, the first of these, with accommodations for fifty men, has just opened its doors.

Wanted: Airplane Inspector—A year's experience as a machinist in a factory making gasoline engines for motor cars or airplanes or as an inspector of airplane or motor car engines is one of the prerequisites of consideration for the position of assistant inspector of engineering material. It is a civil service position.

Colorado Plans Million for Roads—More than $1,000,000 will be spent this year to improve and extend Colorado's system of state highways. The commission has apportioned $600,000 from the state road fund for this work, and about $500,000 has been pledged by several counties to use jointly with their respective shares of this state money.

1000 Trees Planted on Dixie—Under the auspices of the Louisville Automobile Club about 1000 shade trees were planted in a day along the Dixie highway on the 11-mile stretch between Louisville and Orell. The club had the co-operation of the St. Helen Commercial Club and the South Jefferson Commercial Club. Boy scouts helped to plant the trees. This stretch of the highway, though the best bit of road in Jefferson county, Kentucky, is the warmest in summer because of the lack of shade.

Studebakers for Canadian Munitions Board—After a thorough and most rigid examination by mechanical engineers of the aviation department of the imperial munitions board an order has been signed with the Studebaker Corp. of Walkerville, Ont., for the immediate delivery of thirty-two series 18 Studebaker cars. The order embraces ten six-cylinder 50 h. p. touring cars and twenty-two six-cylinder 50 h. p. combination station and passenger cars. These cars are to be put in service at once and will be used in the work of the department at Camp Borden and the Toronto headquarters.

Goodyear to Build Club—The Goodyear Tire & Rubber Co., Akron, Ohio, will build a clubhouse at a cost of $450,000 which will be known as Goodyear Hall and will be devoted to the activities of the 19,000 Goodyear employes. There will be a gymnasium, an auditorium seating 5000, a swimming pool, rifle range, shower baths, bowling alleys, club rooms and a few more accessories. The club will be within walking distance of Seiberling field, devoted to the athletic activities, and Goodyear Heights, where 500 Goodyear employes live now and where room for 5000 more is being constructed.

When Are Safety Zones?—The Kansas City traffic ordinance is being interpreted that safety zones are safety zones only when the standards are in position and crossing patrolmen on duty. Several motorists have got into trouble because they passed downtown safety zones in the evenings, when the standards were down and patrolmen absent, just as they passed the zones in the daytime, while street cars were loading or unloading. The interpretation applies to safety zones marked on streets of residence districts, where there are no standards or patrolmen—motorists cannot pass them when a car is loading or unloading, according to the courts.

Among the Makers and Dealers

REPUBLIC Increases Capital—The Republic Motor Truck Co., Alma, Mich., has increased its capital from $1,312,500 to $1,500,000.

Biggam Buys New Factory—The Biggam Trailer Corp. has purchased a factory building at Owosso, Mich., and will manufacture motor car trailers.

Wilson Transferred to Flint—E. B. Wilson, formerly of the Buick Motor Co., Chicago, has been transferred to Flint, Mich., as special factory representative.

Klee Resigns from Stutz—E. T. Klee, manager of the service department of the Stutz Motor Car Co., has resigned to accept a similar position with the Premier Motor Corp., Indianapolis, Ind.

Frank Leaves Lozier—Seymour J. Frank, assistant secretary of the Lozier Motor Co., Detroit, has resigned to return to the practice of law, in which he was engaged before joining the Lozier Motor Co.

F. D. Truck & Auto Organized—The F. D. Truck & Auto Co. has been formed at Adrian, Mich. It is the successor to the Forduplex Co. The Duplex Motor Co., of Lansing, Mich., objected to the use of the latter name, though the Ford Motor Co. had given its permission. The company is looking for a factory site.

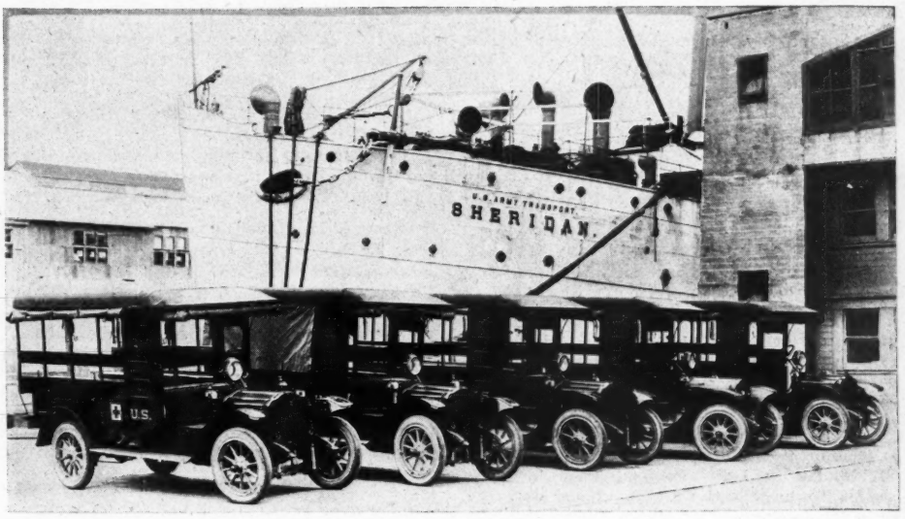
Saginaw Increases Capital—The Saginaw Motor Car Co., Saginaw, Mich., has increased its capital from $100,000 to $1,000,000, all of which will be in common stock. The company has orders on hand for 800 cars. It now employs sixty-five men but in the next thirty days expects to increase this number to 150 and within one year to 500.

Central Mfg. Plant Burns—The metal department of the Central Mfg. Co., Connersville, Ind., maker of bodies, has been destroyed by fire, causing a loss of $150,000. The fire is thought to have been of incendiary origin. Three hundred men were thrown out of employment. William B. Ansted, president of the company, said the plant will be rebuilt at once.

Hanauer Joins Hal Company—Darwin Hanauer has been appointed chief engineer for the Hal Motor Car Co., Cleveland, Ohio. Mr. Hanauer held a similar position with the Baker, Rauch & Lang Co., to whom he went from the R. M. Owen Co., when the manufacturing rights of the Owen-Magnetic were acquired by the former concern. He will specialize in designing custom-built bodies for the Hal-twelve chassis.

Kissel Donates Ambulance—George A. Kissel, president and general manager of the Kissel Motor Car Co., Hartford, Wis., has donated a complete ambulance vehicle unit with full equipment to the Wisconsin branch of the American Red Cross Society, and his gift has been duplicated by John Day, a wealthy resident of Hartford. The two ambulance units will be constructed on Kissel-Kar chassis and will be attached to the Wisconsin Ambulance Corps.

Goodyear Changes Branch Managers—The Goodyear Tire & Rubber Co., Akron, Ohio, has made the following changes in branch managers, to take effect immediately; E. B. Sigerson, former manager at Buffalo, N. Y., special work in the motor car tire department at Akron; C. M. Klopp, former special motor truck tire representative at Syracuse, N. Y., branch manager at Buffalo; J. E. Taylor of the motor car tire department at Akron, manager at Charlotte, N. C.; M. Orr, former manager at Charlotte, in charge of the Syracuse branch; W. C. Blake, for six years manager at Syracuse, branch manager in New York, succeeding P. W. Smith, who has resigned to take up other work.



U. S. PREPAREDNESS IN PHILIPPINES—Here is shown a fleet of White army ambulances on the dock in San Francisco waiting to be shipped to the Philippines. Medical units of twelve motor ambulances and a ¾-ton repair truck will use them

Jenney Engineer for Lock Company—Charles D. Jenney has been appointed chief consulting engineer of the Detroit Model Lock Co., Detroit.

Cullen with Chalmers—George R. Cullen, formerly of the advertising department of the Hudson Motor Car Co., has joined the advertising force of the Chalmers Motor Car Co., Detroit.

Signal Maker at Toledo—The L. L. Britton Co., a corporation of New Mexico, maker of motor car signals, has established its business office at Toledo, Ohio, to make and sell the Britton Auto-Signal.

Pays Employees for Army Service—The Reo Motor Car Co., Lansing, Mich., gave forty-two employes who served with the Lansing battery on the Mexican border, more than half their salary for the eight months the soldiers were absent, on their return to work this month. Some of the men had more than $400 in back pay.

Exclusive Rights for "Astra" Sales—The Bradford-Ackermann Corp., New York, has made arrangements with Ashton, Laird & Co. for the sole selling rights of their "Astra" high temperature gas apparatus and oxygen welding appliances. A new and standardized line of oxy-illuminating gas apparatus made by this company will be marketed also.

Parker Rust Proof—The Parker Rust Proof Co. now includes among its licensees the Packard Motor Car Co., Reo Motor Car Co., the Byrne-Kingston Co., the Carter Carburetor Co., the Marvel Carburetor Co., Chalmers Motor Car Co., Houk Mfg. Co., Spark-Withington Co., Firestone Tire & Rubber Co., Harrison Radiator Co., and the Perfect Window Regulator Co.

Gear Makers Organize—An organization of gear manufacturers has been formed at Lakewood, N. J. This organization will be known as the American Gear Manufacturers' Association. Its purposes are to advance and improve the gear industry in a general way by the standardization of gear design, manufacture and application. F. W. Sinram of the Van Dorn & Dutton Co., Cleveland, Ohio, is president. H. E. Eberhardt of the Newark Gear Cutting Machine Co., Newark, N. J., is vice-president.

Brooks Joins Lehman Company—J. E. Brooks has been appointed sales manager for the Lehman Mfg. Co., Canelton, Ind., maker of Lamco speed bodies.

Birkett with Standard-Detroit Tractor—W. G. E. Birkett, former advertising manager of the Gray Motor Co., Detroit, has been appointed advertising manager of the Standard-Detroit Tractor Co.

Wise on Laboratory Staff—Karl M. Wise has been added to the staff of the Detroit Testing Laboratory, Detroit, and will have charge of the motor car and metallurgical department. Mr. Wise was formerly assistant engineer with the Chalmers Motor Car Co.

Chicago Buick Gets Implement Men—Joseph H. Browning, for the last few years sales manager of a division of Deere & Co., in the farm implement trade, has become identified with the Buick Motor Co., Chicago. Lee Powell, representative in Kentucky of the John Deere Plow Co. for four years, also has joined the Buick Motor Co., Chicago.

Summerville with Winther—W. A. Summerville, western division sales manager for the Republic Motor Truck Co., Alma, Mich., has resigned and becomes zone sales manager for the Winther Motor Truck Co., Kenosha, Wis. Mr. Summerville will be recalled as the advertising manager of the Rapid Motor Vehicle Co., Pontiac, Mich., in the early days of the industry.

Rust-Proof to Extend Branches—The Parker Rust-Proof Co. of America will erect branches in principal cities of the country. Two factories will be erected in New York, Chicago, Brooklyn, N. Y., and Philadelphia, Pa. One plant will be built in Buffalo, N. Y., Syracuse, N. Y., Pittsburgh, Pa., Altoona, Pa., Boston, Mass., Worcester, Mass., Hartford, Conn., Bridgeport, Conn., Providence, R. I., Newark, N. J., Baltimore, Md., Milwaukee, Wis. Indianapolis, Ind., St. Louis, Mo., Minneapolis, Minn., St. Paul, Minn., San Francisco, Cal., Kansas City, Mo., and the following Ohio cities: Cleveland, Cincin-

nati, Columbus, Dayton, Toledo and Youngstown. The Cleveland plant has been in operation for some time.

Monson Leaves Buick Branch—M. J. Monson has retired as manager of the Buick Motor Co., Milwaukee, Wis., to go into business for himself.

Cullen Joins Chalmers—George R. Cullen, formerly of the advertising department of the Hudson Motor Car Co., has joined the advertising force of the Chalmers Motor Co., Detroit.

Burger Resigns From Clear-Room—G. Franklyn Burger has resigned his position as sales and advertising manager of the Vincent Clear-Room Steering Wheel Co., Detroit. His future plans have not yet been announced.

Eight-Hour Day at Marathon Plant—The Marathon Tire & Rubber Co., Cuyahoga Falls, Ohio, has started the operation of its plant on an eight-hour full pay basis, allowing three eight-hour shifts. Sales for a given period of this year have increased more than 75 per cent over those of the same period last year.

Welbon Forming Doble Agencies—W. G. Welbon is in Detroit forming three companies to handle the Doble steam car, the Ohio Doble Steam Car Co. of Cincinnati, the Indiana Steam Car Co. at Indianapolis and the Kentucky Steam Car Co. at Louisville. In addition to these three states Welbon probably will also handle West Virginia.

Inglis Brings Out Pump—The Inglis Mfg. Co., Milwaukee, Wis., formerly the Wallmann Pump & Tank Co., has brought out a new automatic measuring device and pump for gasoline. Raising a small lever admits compressed air from a small supply tank and pushes up a hoist, which discharges the fuel directly into the reservoir on the car or truck and automatically measures quantities from 1 pint to 1 gal., or from 1 quart to 5 gal., as designated on a dial.

Comet Elects Officers—The Comet Automobile Co., Decatur, Ill., recently organized, has elected officers as follows: President, G. W. Jagers; vice-president, G. V. Beck; secretary, W. E. Lewis; treasurer, G. W. Jagers; assistant treasurer, F. S. Zumdall; assistant secretary, T. J. Cowgill; general sales manager, G. V. Beck. J. M. Callahan, the former vice-president, and W. D. McClain, the former secretary-treasurer, both of Chicago, have retired from the company. Work upon the plans for the factory building has commenced, and material for the assembling of cars in the temporary plant is arriving.

Soward Leaves Nash Motors—E. G. Soward has resigned as passenger car sales manager for the Nash Motors Co. to enter business for himself.

New Studebaker Service Building—The Studebaker Corp. will erect a three-story structure of brick, steel and concrete for use as a sales room and service station at Windsor, Ont.

Heartz with Moreland—Roy D. Heartz, former sales promotion manager of the Hupp Motor Car Co., has accepted the position of assistant sales and advertising manager of the Moreland Truck Co. of Los Angeles.

Boone Tire Plans Third Plant—The Boone Tire & Rubber Co., Sycamore, Ill., and Des Moines, Iowa, will establish a third plant at Chippewa Falls, Wis. A building will be erected at once and with equipment will represent an investment of approximately $50,000.

Tire Factory for Dallas—The Southwestern Tire & Rubber Mfg. Co. will establish a factory with a capital of $250,000 and a plant costing $80,000 at Dallas, Tex. The plant will contain 30,000 sq. ft. of floor space and turn out 500 tires and 1500 inner tubes daily. The officers are: President, R. L. Cameron; vice-presidents, W. W. Taxis and L. G. Murray; secretary, W. E. Shuttles; and treasurer, J. G. Gillespie.

Thropp and Delion Not Connected—There is no connection between the John E. Thropp Sons Co., manufacturer of tire machinery, and the Delion Tire & Rubber Co., New York, with a factory in Trenton, N. J. The writer of a recent Delion advertisement stated that the Delion factory is operated and controlled by the Thropp company, whereas the Thropp company is not in any way connected with the Delion company. Delion, however, uses the Thropp system in manufacturing its tires.

Pfau to Triple Output—The Pfau Mfg. Co., Cincinnati, Ohio, declared the regular quarterly dividend of 1¾ per cent on the preferred stock of record March 20, payable April 1. The company has orders on hand covering a maximum production for several months in advance. The motor car equipment department is rushed with both finished metal and woodwork orders, and the company is about to break ground for a new building of equal size with the present building. Work will be started on it within the next two weeks. It will be full brick construction over steel, four stories high. The new plant will triple the output.

Canadian Chevrolet Increases Stock—The Chevrolet Motor Co. of Canada, Ltd., Oshawa, Ont., has increased its capital stock from $500,000 to $1,500,000.

Bowser Increases Capital—S. F. Bowser & Co., Fort Wayne, Ind., has increased its capital stock from $800,000 to $1,250,000. The estimated business for the year is $2,000,000, a 25 per cent increase over 1916.

Davies Joins Burd Ring—W. C. Davies has been made secretary and comptroller of the Burd High Compression Ring Co., Rockford, Ill. Mr. Davies was auditor at the Chicago branch of the Hudson Motor Car Co.

Hyser Is Promoted—A. C. Hyser, formerly manager of the Atlanta branch of the Willard Storage Battery Co., has been appointed general service manager for the company with headquarters at the home office in Cleveland, Ohio.

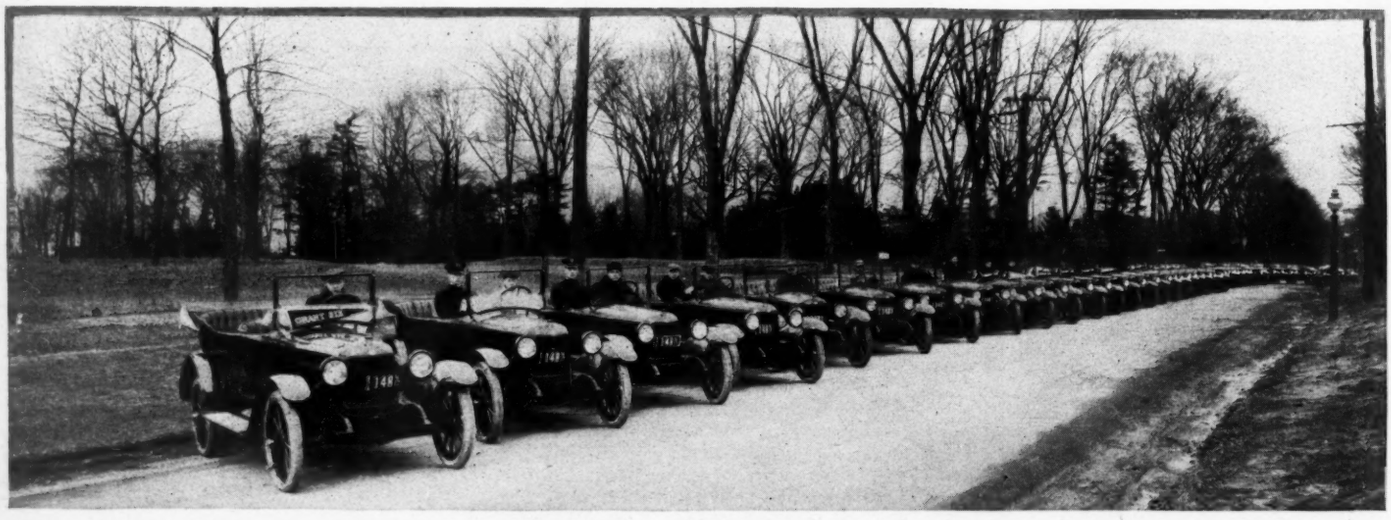
Hayes Orders Machinery—The Hayes Wheel Co., Anderson, Ind., has placed an order for $10,000 worth of machinery for its plant. The company expects to manufacture from 1200 to 1500 sets of Ford wheels daily when the machinery is installed.

Puritan Buys R. C. H. Stock—The Puritan Machine Co., Detroit, has purchased the service stock of the R. C. H. Corp., Detroit. The purchase includes the patterns and records, besides the repair parts. This makes 108 orphan cars for which the Puritan is supplying parts.

Birdsall Joins Pullman—E. T. Birdsall has been appointed consulting engineer of the Pullman Motor Car Co., York, Pa. George McCrickett, former chief draftsman of the Pennsy Motors Co. under Mr. Birdsall has resigned to take a similar position with the Pullman company.

Champion Ignition Adds Space—The Champion Ignition Co., Flint, Mich., has let the contract for another story to be added to one of its buildings, which will give an increased floor space of 10,000 sq. ft. This is the third addition within eighteen months. The floor space then was 27,000. It is now 80,000 sq. ft.

Ohio Electric Appoints Agencies—The Ohio Electric Vehicle Co. has appointed new agencies including Mammoth Motor Car Co., Lexington, Ky.; Adams Cooper Motor Sales Co., Fort Smith, Ark.; Electric Garage, Galveston, Tex.; Coffin Motor Co., Indianapolis, Ind.; Bry & Diller, Des Moines, Iowa, and C. A. Condon, Minneapolis, Minn.



MILITARY SCHEDULES IN THE INDUSTRY—One of the longest driveaways during the freight shortage was that of the Chicago distributor of the Grant Six, who took sixty-two overland from Cleveland without an accident